# The Chemical Age

**A Weekly Journal Devoted to Industrial & Engineering Chemistry**

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## Contents



*NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Other communications relating to advertisements or general matters should be addressed to the Manager.*

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### The Chemist's Introduction to Works

IT is true of the chemist and chemical engineer as of members of other professions resting on a scientific training and basis that their ultimate sphere of usefulness is more a matter of chance and opportunity than the result of definite intention or pre-eminent talent. On entering the College or University the average student is committed to a definite course of training, possibly with the option of changing his mind at the end of the first year. As the course draws to its close the somewhat distasteful question of earning his bread and butter with an adequate amount of jam on it becomes of more than passing interest, and our graduate, in looking for a job, weighs carefully the relative financial and other advantages and disadvantages of analytical or academic work as against employment in industry. As has been frequently shown in these columns the teaching profession postulates at the present time either private means or some personal sacrifice either for the commonweal or on the altar of science, while our graduate's mentors are too often unable to present a true picture of the life of a works chemist or his equivalent on the chemical engineering side. The outcome is only too often uncongenial employment for a man who is unfitted for the industrial sphere, or conversely, though less frequently, the temporary influence at a University of an individual incapable of handling students or of imparting his knowledge to them. This state of affairs is equally deplorable from the employer's standpoint, who has nothing to go upon but the details of the applicant's training and education tempered by a varying capacity for "sizing up" his man.

THE provision of industrial laboratories at our leading Universities for post-graduate study in the operation of chemical plant is clearly insufficient to bring out the inherent qualities and the fitness of an individual for an industrial future, particularly if such laboratories are fitted up in an elaborate and inflexible manner instead of being designed to give full play to imagination, ingenuity, and resource. The remedy is undoubtedly a policy of whole-hearted co-operation between manufacturers and the universities, and we cannot do better than profit by and, if possible, improve upon a scheme which has just been launched in Canada. *The Canadian Chemical Journal* holds quite rightly that the attitude of those who commonly employ chemists or undertake chemical control of their operations has never been a generous one as far as students have been concerned. They have wished to obtain a finished product, capable of directing work or controlling it, without considering that it is hardly the function of any university to produce men capable of immediately giving such services. Manufacturers whose whole business may depend on chemical control have not conceived that they had any particular duty to perform. This is an unprofitable attitude on their part, and, without pointing it out too clearly, we can only say that, as well as inviting students to meetings and dinners and giving them on all occasions much reasonable advice regarding their future, they should adopt a constructive policy, and actually employ one or more students in chemistry during the long vacation. This argument is not advanced with the idea that such a policy would necessarily be an unprofitable one from the view point of the average company. Most students are willing, in fact anxious, to work, and work hard, which is not a characteristic of all modern labour.

In commending such a plan to manufacturers in this country, we realise that it is in the nature of an experiment and that a large amount of prejudice and innate secrecy—fortunately a steadily diminishing quantity during the War—has still to be overcome. There are also works which have never had a real

chemist in their employ, and such will certainly become easy converts if they are supplied with the right type of man. There is no time to be lost if the threatened over-production of chemists is to be satisfactorily absorbed, and the problem is one of such importance that we shall be pleased to give space to its fuller discussion; incidentally, it seems one eminently suitable for action by the Association of British Chemical Manufacturers in conjunction with bodies representing the teaching profession and our learned and technical societies.

## The Government and Gas Supply

THE question of the public gas supply is one of essential importance to the chemical engineer, for, viewed from every standpoint, there is no doubt that as a fuel for all purposes in industrial and manufacturing works towns' gas has few, if any, rivals. Those who are acquainted with the operation of works other than gasworks probably have little knowledge of the somewhat truculent manner in which the latter concerns are brought to heel if they fail to do what Parliament prescribes that they shall do. The gasworks, however, fulfil a public function, they enjoy something in the nature of a monopoly, and it is only reasonable that those who pay for the commodity should receive their meed of protection.

For the past six years, however, the gas consumer has received more than his just measure of relief; for, bound by archaic Acts of Parliament or fatuous modern ones, the gas industry has been drifting quicker and quicker into something approaching bankruptcy. Parliament has at length realised that while, with the resources of the Empire behind it, it has to pay 5 and 6 per cent. interest in order to attract the investor, it is scarcely reasonable to expect those who have built up the gas industry to rest satisfied with a mere 3 per cent., which is all that is really permitted by existing legislation. Gas investors have been hard and unfairly hit since 1914, but they may find a good deal of encouragement in the fact that on Wednesday of last week Sir Robert Horne introduced a measure which seems destined to bring great changes in one of our most important industries. The Gas Regulation Act, as it is called, paves the way for the introduction of a new method of selling gas, namely, in "therms" instead of in cubic feet, and while the consumer will be protected in that he will pay only for the actual useful energy he receives, the gas undertakings will, apparently, benefit from the fact that the legislation which now ties their hands will be adjusted so that the dividends they are able to pay will be more commensurate with modern standards.

Incidentally, the Bill appears to make a pretty heavy demand upon the ingenuity of that section of the chemical engineering profession which is responsible for the operation of gasworks, for not only is a prescribed limit placed upon the percentage of incombustible constituents permitted in the gas, but the calorific power must not recede from the declared value by more than 5 per cent. To the uninitiated this may seem all very straightforward and reasonable, but only those who have had actual experience of the idiosyncrasies of gas production (more especially in those instances when the proportion of water gas added has to be varied to suit the demands of the moment) can appreciate that the daily round and common task is not in the future going to be an entirely delectable one. However, if the wind contains some gusty elements it is probably going to blow someone a certain amount of good, for a glance through the new Act gives the impression that we may see yet another new official army, namely, a horde of public gas testers, descending on every locality in the country. It is only reasonable to suppose that the new army will draw its strength almost exclusively from the chemical profession.

## The Fall in Metals

IT would seem that something approaching demoralisation has gripped hold of the metal market, but one does not have to go far to look for the reason. The fall in prices is, however, on an almost unprecedented scale. To quote a few examples, within the space of two and a half months copper has declined by 28 per cent. to £87 per ton, tin by 32 per cent. to £283, spelter by 26 per cent. to £45, and lead by 27 cent. to £37 per ton. The metal market is not, of course, the only one which is suffering; and, perhaps, the prevailing uneasiness may be largely traced to the apprehension of a levy on capital. The British Metal Corporation has recently issued a circular in which it speaks of over-speculation, and shows that the speculation revealed by the tightening of money and the reversal downwards of the curve of general prices was far greater than had been suspected and was evidently solidly for the rise. The quantities of metals left in speculators' hands must by now be very largely reduced and the position rendered sounder.

The banks throughout the country are generally inclined to withdraw facilities for loans, and they are certainly not willing to provide money for speculation, and this fact alone has caused a good deal of apprehension. It is said that, as regards the four metals quoted above, the prices to which they have fallen are below the average cost of production, and outputs will certainly be affected if such low figures prevail for any length of time. This would be unfortunate, as the best opinion appears to be that there is still a large potential demand awaiting satisfaction, and this will be apparent as soon as the wreckage of speculation is cleared and the other causes of anxiety removed.

Meanwhile, the lead position is the most difficult of all, for the Broken Hill strike still continues. Mexican output seems likely to be upset by the revolution, and the Government here appears to have little to dispose of. The result is that visible stocks are down to about 20 per cent. of what they were a couple of months ago, and it looks as if the metal will be decidedly scarce during the coming months.

## A Parting Shot

DR. MANNING, who has just resigned the directorship of the United States Bureau of Mines and been succeeded by Dr. F. G. Cottrell, the well-known chemist, includes in his letter of resignation a pointed reference to the claim of scientific workers in the Government service to more generous recognition. "In leaving

the Government service," he writes, " there comes to me, as it has over and over again, the thought that although this Government spends each year many millions of dollars in useful scientific work for the benefit of the whole people, the monetary recognition of its scientific and technical servants is not sufficient to enable them to continue in the service for the people. With the marvellous expansion of industry in this country and the growing necessity of science to industry the scientific bureaux have been utterly unable to hold their assistants against the competition of industry which is taking their highly trained men at salaries the Government does not pay or even approach. I feel very deeply that there ought to be more adequate compensation for the scientific and technical men in the Government service so that none of them may be compelled to accept positions outside. Many of these scientific men are of a fine type for Government work, care little for the commercial field, take an intense professional interest in their tasks, and are of inestimable value to the Government." So nearly alike are the conditions in this country and in the United States in this matter that Dr. Manning's letter might stand as an exact description of the attitude of our own Government to the class of scientific workers in the national service.

## "Dangerous" Goods

THE action brought by the Midland, Great Western, and Lancashire & Yorkshire Railway Companies against Brotherton & Co., Ltd., and Wm. Butler & Co. (Bristol), Ltd., has terminated in a unanimous decision in favour of the applicants, who claimed to treat as " dangerous " goods heavy naphtha conveyed under the description of " mineral coal tar." According to the judgment of Mr. Justice Lush, it is difficult to see how, on legal grounds, the Court could have found differently, for here, as in so many cases, the law seems designed to place the trader at the mercy of the railway company. The Legislature, Mr. Justice Lush pointed out, has from the earliest times in the history of railway legislation quite clearly left it to the railway companies to decide what goods are dangerous, and empowered them to refuse to carry any goods which, in their judgment, are dangerous. This gives a very wide discretion to railway companies, and in case of dispute all that they are required to do is to show that they are acting *bona fide* and on reasonable grounds; that is to say, their decisions must not be palpably capricious or pedantic. On the question of fact, whether the railway companies had acted in good faith and on reasonable grounds in deciding to treat heavy naphtha as dangerous, the Court was entirely with the companies. The defendant's plea that no accident had been recorded in the conveyance of these goods, and that that in itself was an argument against their dangerous character, was met by the answer that freedom from accident did not necessarily imply absence of risk. The defendant companies will have the sympathy of their trading colleagues in the plucky stand they have made against the railway companies' claim, and once more the result is to show how strongly entrenched the position of the railway companies is in matters of dispute either with traders or with passengers.

## The Axolotl

THE following reflection on the chemical transformation of *Axolotl* into *Amblystoma* under the influence of ox-thyroid (Royal Society Soirée, May 12, 1920), reaches us from a well-known figure in chemical industry :—

(*Air, " Maid of the Mountains."*)

Oh, come with me and you shall see
The Axolotl gay,
He's only here three weeks or so,
He hasn't come to stay;
He'll be a salamander soon
Disporting in the warm lagoon,
A snack of thyroid does the trick,
Research has found a way!

## On the Brussels Bourse

A FRENCH reader of THE CHEMICAL AGE is good enough to send us the following note : " As a regular reader of your journal from the start you may be interested in an incident which I noted at Brussels. Having occasion to visit the Bourse there, I noticed two members with a yellow-coloured production sticking out of their pockets, and as I had my own CHEMICAL AGE with me I was curious to see whether they were readers too. I discovered that they were, like myself, regular subscribers to your journal. I thought you might be interested in this incident as showing the unexpected places in which one meets with THE CHEMICAL AGE outside England."

## The Calendar

| | | |
|---|---|---|
| June 1-2-3 | The Institution of Gas Engineers: Annual General Meeting. | Institution of Mechanical Engineers, Storey's Gate, London. |
| 1 | London University: " The Biochemistry of Sterols," by Dr. J. A. Gardner. 5 p.m. | Physical Laboratory, South Kensington, London. |
| 2 | Sir John Cass Technical Institute: " Factors in the Froth-Flotation of Minerals, by H. L. Sulman. 5.30 p.m. | Jewry Street, Aldgate, London. |
| 2 | Society of Public Analysts: Papers by R. L. Morris; H. D. Richmond; and E. R. Dovey. | Chemical Society's Rooms, Burlington House, Piccadilly, London. |
| 3 | Royal Society: " Nuclear Constitution of the Atom," by Sir E. Rutherford. 4.30 p.m. | Burlington House, Piccadilly, London. |
| 3 | Chemical Society. 8 p.m. ... ... | Burlington House, Piccadilly. |
| 4 | Royal Society of Arts: " The Oil Resources of the British Empire," by Sir John Cadman. | John Street, Adelphi, London. |
| 4 | Royal College of Science: " Liquid Air," by J. P. Dowdall. | Chemical Society, Royal College of Science, South Kensington. |
| 5 | Royal Institution of Great Britain: " Recent Revolutions in Physical Science — (II) The Theory of Quanta," by J. H. Jeans. | Albemarle Street, Piccadilly, London. |
| 5 | The Mining Institute of Scotland: General Meeting, 3 p.m. | Heriot Watt College, Chambers Street, Edinburgh. |
| 5 | North of England Institute of Mining and Mechanical Engineers: General Meeting, 2 p.m. | Newcastle-on-Tyne. |

# Industrial Applications of Liquid Air and Oxygen—II

By "Ergo"

*In the second instalment of his article the writer deals with the transportation and vaporisation of liquid oxygen. He also discusses the uses of the liquid substance for explosive purposes, and indicates that as a blasting agent it may before long become a serious competitor to those explosives at present in use.*

### Transport of Containers

Some users of liquid oxygen containers provide them with trunnions which are adapted to rest upon bearings formed in wooden boxes of truncated pyramid form, and the existing railway regulations require strong oak boxes to be provided. It is doubtful, however, whether such heavy cases are necessary, for quite satisfactory results have been obtained by placing the containers in stout wicker baskets packed with slag wool. In view, however, of the need for quick transit on account of evaporation loss (which increases slightly with the jolting necessarily accompanying transit), it is doubtful whether any considerable use will be made of liquid oxygen when the source of supply is so far away that a railway journey is necessary.

With regard to the important question of safety of liquid oxygen it may be pointed out that the liquid is quite harmless, although it should not be allowed to remain in contact with the skin. Oxygen in liquid form is not, of course, explosive, although it will violently support combustion; we are really concerned only with the relative safety of liquid and compressed oxygen. The latter is now safe to handle because the makers have exercised minute care in the choice and testing of cylinders and in their filling. With the same amount of care bestowed upon liquid oxygen containers they should be quite as safe to handle as the compressed cylinders.

### Vaporisation of Gas

Liquid oxygen can be employed for all those purposes for which compressed gas is being used at present. These purposes may be summarised as cutting and welding metals, and medical uses, including mine-rescue work and breathing in vitiated or rarefied air.

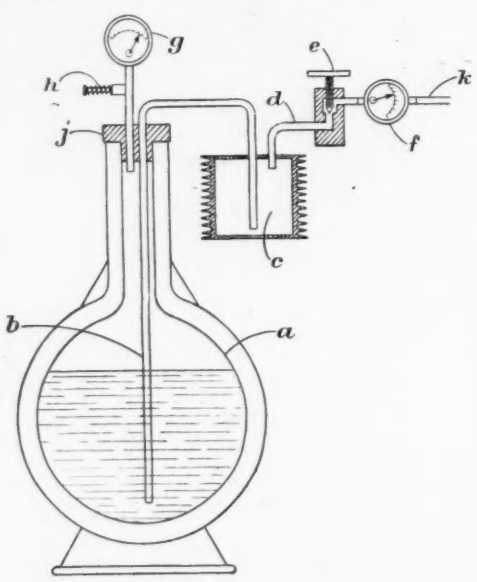
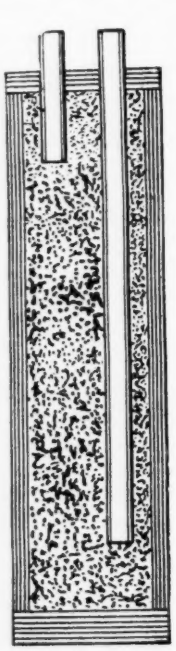



FIG. 2.

For these uses the liquid has to be converted into gas at normal temperature by means of a *vaporiser*, one effective form of which is illustrated in diagrammatic form in Fig. 2.

The container *a* is provided with a closing cap *j* through which passes a syphon tube *b* and a tube connected to a release valve *h* and pressure gauge *g*. The syphon tube *b* passes into a vaporiser box *c* which should be fitted with gills or fins in order to provide a large radiating surface. A tube *d* passes from the top of the vaporiser into a flow-control valve *e* and thence out through a tube *k*. The flow-control valve *e* is usually of the needle-throttle type and



F.G. 3.

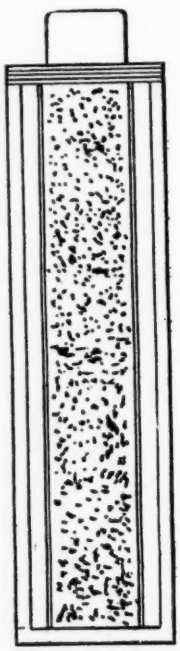


FIG. 4.

in some cases a flow-meter *f* is provided to indicate the rate of flow of the gas. The tube *d* is usually provided with a coil so that the gas may be warmed up before it enters the flow-control valve.

### Action of Vaporiser

The action of this type of vaporiser, which was first suggested by Sir James Dewar, resembles that of an automatic pump and is as follows.

Assuming that the flow-control valve *e* is open, the liquid which is constantly boiling inside the container *a* quickly generates sufficient pressure above it to force some of the liquid up the syphon tube and down into the box *c*. As the temperature of the box is nearly 200°C. above that of the liquid, the latter immediately boils violently and generates sufficient pressure to drive the remainder of the liquid back into the container. As the valve is open this back pressure very soon becomes dissipated as the oxygen flows out of the tube *k* and some more liquid is then pumped over into the box *c*. Immediately, therefore, the valve is opened there is set up an automatic pumping action which continues so long as the valve remains open. The amount of gas generated per minute is governed by the extent to which the valve *e* is opened, and any desired rate of flow can be obtained by adjusting the valve until the flow-indicator *f* gives the reading desired. This adjustment of the valve *e* controls the flow because it controls the time which must elapse before the pressure in box becomes less than that in the container above the liquid. The pressure above the

liquid is indicated by the pressure gauge *g*, and is controlled by the blow-off valve *h*. Good results are obtained by adjusting the latter to blow off at about 15 lb. per sq. in.

### Use for Explosives

Liquid oxygen has been used in Germany, apparently with considerable success, for rock blasting purposes.

Cartridges employing liquid oxygen for this purpose have the great advantage that they automatically become "dead" in a short time if they are not fired.

Two principal forms have been employed, known respectively as the Kowatoch cartridge and the Messer cartridge. In the Kowatoch cartridge, Fig. 3, a cardboard cylinder is made of the same diameter as the hole bored in the rock and is filled with lampblack or other material rich in carbon; it is closed at both ends with cardboard or cork, and has two small cardboard tubes. A metal rod is inserted into each tube and the cartridge is then packed into the hole and the rods extracted. Liquid oxygen is then poured into the larger tube through an elbow funnel, firing being effected electrically.

In the Messer cartridges, Fig. 4, the walls are made of corrugated cardboard; they are dipped into a bath of liquid oxygen, being first exposed for a short while to the vapours to cool them off. Immersion lasts for about half-an-hour, the ignition system is then attached as quickly as possible, and the cartridge is placed in the bore-hole, as shown in Fig. 5.

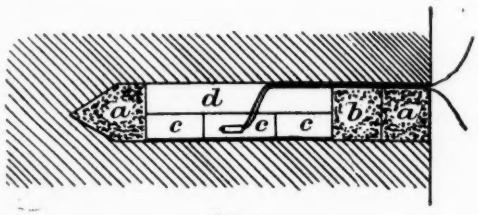



FIG. 5.

Manipulation by this method was found to be far simpler than in the one previously described. The only inconvenience is the unavoidable delay between the removal of the cartridge from the liquid air and the insertion of it in the bore-hole; for, during the lapse of these few minutes, a portion of the oxygen evaporates. To minimise this loss, and to keep a sufficient excess of oxygen in the lampblack, the walls are made waterproof. The cartridges will maintain their efficiency for eight to ten minutes after they have been taken out of the liquid.

No detonation is necessary to explode these cartridges, this being an advantage of the method; all that is necessary is a small primer ignited by a fuse or electrically.

The application of liquid oxygen as an explosive for industrial purposes is one which has not as yet been put into operation in this country, but which shows great promise of development. Some experts consider it to be unsuitable for coal mines on account of the possible presence in the mine of explosive gases; but for ore mining, tunnelling and quarrying it has every prospect of becoming a very serious rival to the methods at present in use.

A REUTER'S message from Washington on Friday, May 21, states that an implied threat of the *de facto* Government of Mexico to force oil producers to make prompt payment of export taxes is revealed in a belated message from the American Embassy in Mexico City to the State Department. The Mexican Department of Finance is quoted as ruling that the taxes for March and April must be paid within five days after May 13 without any extension of this time-limit. The companies, it is added, will not be expected to comply with the decree issued recently by the Carranza Government, which almost doubled the amount of the taxes, but may pay an assessment in accordance with the tariff prevailing in January and February.

## Mr. F. T. T. Reynolds

### First Vice-President of the Chemical and Dyestuffs Traders' Association

MR. FRED. T. T. REYNOLDS, who has been elected first Vice-President of the new Chemical and Dyestuffs Traders' Association, was born in Boston (Linc.) in 1864, and has spent the whole of his business life in Manchester. He has been associated with the century-old firm now known as Millwards Merchandise, Ltd., for over 40 years, and is now chairman of its board of directors. In Mincing Lane he is looked upon as an authority upon indigo and natural dyes, and probably few people in the chemical and dyestuffs trade have a wider personal acquaintance with the many interests concerned. He possesses in a marked degree the confidence of many of the leading consumers, and is associated with world-wide connections. Mr. Reynolds has travelled extensively and has written and lectured freely upon his travels and experiences. His book "Across Three Oceans and Thro' Many Lands," published in 1900, had a large circulation and met with much appreciation.

Recognising that an active business life imposes rather than exempts from civic responsibilities he has devoted much time and thought to a wide variety of public affairs. He has held

[*Photograph by Gresswell, Southport.*]

MR. F. T. T. REYNOLDS.

and now holds many offices in business, hospital, political and other organisations. In 1911-12 he was Mayor of Southport and is now one of its justices of the peace. During the war he applied himself with great assiduity to war work especially in connection with the recruiting and training of soldiers, and later to hospitals for the sick and wounded. He assisted various Government Departments in both a practical and an advisory capacity, and during the past five years he has visited many countries on business and economic affairs. He is a great believer in trade as one of the cords that bind men and nations, and advocates strongly a close commercial connection between the English-speaking peoples as one of the surest ways of securing the peace of the world and of benefiting humanity.

Mr. Reynolds has an intimate association with The Cronkhite Co., Inc., Boston, one of the most enterprising distributing organisations in the United States, and is in constant touch with developments on both sides of the Atlantic. He has on various occasions been approached with a view to entering the House of Commons, but so far has preferred to apply his energies in directions that yield more tangible—and perhaps not less valuable—results. He may certainly be relied upon to do everything possible to make the Chemical and Dyestuffs Traders' Association an assured success.

# Notes on the Nitrate Industry of Chile

## By A. Bertrand

*In* THE CHEMICAL AGE *of April 17 last we gave a summary of a statement communicated by A. Bertrand to the Societe de Chimie Industrielle, and published in "Chimie & Industrie," on the results of a personal investigation of the nitrate industry in Chile. In that statement the historical development of the extraction process and its defects were discussed, while in the concluding statement, which is summarised below, the present extraction process is fully described and the problems which arise in connection with it are discussed.*

### Preliminary Treatment of the Raw Material

THE nitrate deposit or "caliche" is broken up by means of explosives, as previously explained, and the material is sorted, classified and placed in heaps by the workmen, and then transported to the nitrate works by mule carts of 2-tons capacity or railway wagons of 4 tons capacity, according to the distance. The carts and wagons are provided with means for tipping them or with trap doors, and the raw material is delivered to crushing machines in which it is reduced to pieces of about 2 in. to 4 in. diameter, containing also a quantity of powdered material which may have been partly in that form when delivered to the crushing machines. In a few instances the raw material may be graded by means of grids or sieves before delivery to the crushing machines to eliminate the finer material.

### Lixiviation of the Raw Material

The lixiviating vats are usually rectangular open tanks of sheet iron about 30 ft. long, 6 ft. wide, and about 8 ft. deep, with a capacity of about 80 tons of raw material. A false bottom is arranged 8 in. from the bottom, and the top is covered by a sliding or hinged grating, while pipe coils are provided through which low-pressure steam is circulated to heat the liquor in the vat. The vats are arranged in a series and the liquor is passed through them in succession in order to saturate it with nitrate. The raw material when it enters the first vat is treated with liquor which has passed through the other vats and is therefore fairly concentrated, while the material in successive vats contains less and less nitrate, so that the weak liquor is first brought into contact with material containing least nitrate. Each vat in turn thus forms the head of the series and receives the raw material, while saturated liquor at boiling point (about 121°C.) is drawn off from it; the temperature of the liquor is gradually increased towards the head of the series. The treatment of the material in each vat lasts from 12 to 24 hours. The chemical composition of the liquor is variable as previously explained, so that the quantity of each salt in solution at a given temperature cannot be accurately calculated, and the experience of the workers is relied upon for an estimation of the state of saturation of the liquor. This uncertainty involves some waste of fuel by the prolongation of the time of boiling after the liquor is saturated, and premature precipitation of nitrate may occur in the settling tanks which follow; or a precipitation of sodium chloride may occur with the nitrate during subsequent crystallisation for the reasons explained in the previous article.

### Settling and Decanting

The liquor is run into rectangular settling tanks about 15 ft. by 9 ft. and about 3 ft. to 6 ft. in depth, with slightly sloping bottoms; the capacity of these tanks is sufficient to treat all the saturated liquor obtained during a run of 24 hours. The time allowed for settling should depend on the nature of the insoluble material to be deposited and on the temperature, and is normally from 10 to 20 minutes. Since the state of the solution is not known with certainty, an endeavour is made to have the temperature above that corresponding to the exact saturation point. It is found that the addition of substances such as aqueous ammonia, sodium carbonate, lime water, guano, flour, glue, &c., will accelerate the deposition of solid matter. The operation is terminated when a light crust of nitrate crystals forms on the surface of the liquid.

### Crystallisation

The crystallising tanks are of sheet iron, about 12 ft. to 18 ft. in length by 10 ft. to 13 ft. in breadth, by 3 ft. in depth, with the floor sloping about 2 deg. to 4 deg. The total capacity of these tanks is about double that of the dissolving tanks, but this ratio is tending to become more equal to unity as the richness of the "caliche" diminishes. The liquor is allowed from 5 to 8 days in these tanks to cool to the surrounding temperature, and at a temperature of 10°C. about 400 grms. per litre should be retained in solution and no sodium chloride should be precipitated; actually, however, about 3 to 4 per cent. of water evaporates during that period with the result that some sodium chloride is deposited with the nitrate. The nitrate crystals are detached from the walls and floor of the tank, which has been emptied, and are placed on the upper end of the sloping floor to drain. The nitrate is then ready to be carried away and packed in bags. Under these circumstances the nitrate always contains a small proportion of sodium chloride from the liquor which remains with the crystals. This may be avoided by washing the crystals with pure water, or with a solution saturated with nitrate only. Centrifugal machines have recently been introduced for effecting this washing.

### Evaporation

Sodium chloride is less soluble in hot water than in cold in presence of nitrate, the solubility decreasing also as the proportion of nitrate increases, and this results in a continuous precipitation of sodium chloride on the walls of the apparatus. The only way in which it has been found possible to avoid this inconvenience is by producing a rapid current of liquid in the pipes of the apparatus and thus localising the deposit of sodium chloride in special receptacles which are periodically emptied. The continuous increase in the volume of the material treated per unit of nitrate obtained leads to the production of more dilute solutions which thus have to be concentrated by evaporation; this is effected by steam heating in a series of two or three evaporators, so as to obtain a multiple effect.

### Separate Treatment of Pulverised Material

In some works a system of treatment of the finely divided material is now in operation, the material being separated either by dry classification before treatment with the solvent liquor, or as a mud after such treatment. The saturated solution of nitrate is separated from the mud by allowing the mud to settle in tanks with flat conical floors, or by filtration, or by centrifugal machines, or by a combination of these. The filters are usually of the rotary type each unit being a drum rotating slowly on a horizontal shaft, and dipping into the liquid. The drum is divided into a number of sectors covered with filtering cloth, which are alternately put into communication with an exhauster and with a compressor. The suction is applied while the sector is passing through the liquid and until it has passed its highest position, so that a deposit of solid matter adheres to the cloth; pressure is then applied to the interior of the sector so that the deposit is detached, and it is then removed by a fixed scraper. Some of the large works are using in preference the "Butters" system in which filters of the type having a large number of flat filter leaves are immersed in the hot liquid, and on which the solid matter is deposited by internal suction and then detached by internal pressure. Another type of filter is also used in which the liquid mud is introduced into a long filtering drum rotating at about 5 revs. per min. and lined internally with filtering material. The liquid is filtered by internal pressure aided by centrifugal force, and the deposit may be washed by subsequently passing water through it. The deposit is detached by applying pressure outside the cylinder. The "Butters" system, installed in some large works since 1913, is the only one tried on a large scale, and very good results have been obtained from it in the shape of an increased yield of nitrate at a lower cost from a given quantity of "caliche."

### Suggested Economies in the Fuel Consumption

In the process of extraction and crystallisation outlined above, it will be seen that the mother liquor always contains a

certain quantity of nitrate which is not precipitated when the hot saturated solution is cooled. This amounts to about 30 lb. per cubic foot, and there is a consequent loss in fuel in successively heating this quantity of salt for each fresh treatment of raw material. The possibility of the use of colloids for varying the dissolving capacity of the mother liquor without change in temperature was mentioned in the first article, and it may be noted here that quite recently a patent, the details of which are not yet available, has been taken out in Chile for the use of a substance which exerts a selective precipitating effect on the nitrate in solution, but the process has not yet been tested on a large scale.

### Recovery of Iodine

The amount of iodine actually recovered from the "caliche" does not amount to more than one tenth to one fifth of the amount available, owing to the restricted market for this product. The iodine is present in the amount of 0·5 lb. to 4·5 lb. per ton and accumulates in the mother liquor. It is recovered by adding sodium bisulphite (made at the works) to the liquor containing sodium iodate, when iodine is precipitated.

### Recovery of Potassium Nitrate

The "caliche" usually contains an average amount of 1 per cent. of potassium nitrate, though the proportion is frequently as high as 4 per cent., and this is recovered by fractional crystallisation. The saturation curves of sodium and potassium nitrates intersect at about 66°C., the potassium nitrate being more soluble above that temperature, but much less soluble below, the solubility amounting to one third at 20°C. and one-sixth at 0°C. These facts render the recovery of the potassium nitrate by fractional crystallisation comparatively simple.

### Inventions Relating to the Nitrate Industry

Although no substantial modification of the extraction process has been made during the last 40 years, there has been considerable study of a more or less scientific nature, and about 300 patents have been taken out in Chile for improvements in the process. About 100 of these relate to the lixiviation process, and they contain proposals for the mechanical agitation of the liquid, for classifying the "caliche," for effecting the solution in the cold and in a non-intermittent manner or under pressure, and for treating the raw material *in situ*. About 80 patents relate to the concentration and evaporation of the nitrate, and about 30 patents propose processes for avoiding waste of fuel. The remainder of the patents relate to various subsidiary details and to the recovery of various by-products. A very small number of these inventions have been tested on a sufficiently large scale to prove their value or otherwise, and at present they must be regarded merely as suggestions. There is, moreover, a regrettable lack of investigation relating to the improvement of the processes as a whole, most of the inventions relating only to improvement in the details; the principles of the process appear to have been accepted as unalterable. There appears to be little technical organisation of the industry as a whole, such as exists in many other more modern industries, and no co-ordination of the efforts of the various investigators to avoid repetition and overlapping of their work.

As a single example of the scope for improvement, it may be mentioned that while the recovery of 1 kilogram of nitrate should theoretically involve the expenditure of about 200 calories of heat, the actual average expenditure amounts to more than 1,100 calories.

### Some Problems in the Nitrate Industry

The author discusses at some length many of the problems of power production, cost of manual labour, and questions of transport, but as these are of local interest rather than of general interest to chemists they are omitted from this summary.

Many problems of a chemical nature, however, remain to be solved. In spite of the improvements introduced in the details of the lixiviation process, there is still a considerable waste of fuel involved in the heating of the insoluble portion of the "caliche," and this loss will inevitably increase as the richness of the "caliche" diminishes, unless some other process of solution is adopted. Another difficulty is that of dealing with the mud or slime and recovering the nitrate from it, and while some economy has resulted from the use of filters, the production of the slime itself might in most cases be avoided. Another problem which is involved in the gradual diminution of the nitrate content in the "caliche" treated is that of obtaining a concentrated solution. The actual volume of liquor necessary for an efficient lixiviation of the raw material is more than sufficient to dissolve the whole of the nitrate, and concentration of the dilute solution then becomes necessary. Some improvements in this connection have already been indicated, but the whole question is really dependent on the price of fuel. In this connection it is suggested that more use might be made of natural evaporation, for which the dryness of the air and the altitude are especially favourable. In fact, it is possible to evaporate from 13 lb. to 36 lb. per square yard of surface in 24 hours, and with shallow evaporating tanks a very rapid concentration might be obtained.

The questions of the best conditions for the crystallisation of the sodium nitrate, potassium nitrate, potassium perchlorate or boric acid have as yet only been considered singly, when it is desired to isolate one particular salt. The problem of the fractional crystallisation of these salts needs investigation as a whole.

### The Future of the Nitrate Industry

No complete survey of the whole of the nitrate zone has yet been made, but according to the estimates of the best authorities the following quantities of caliche are still available:—

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 9 | million | tons | containing | about | 40 | per cent. | of nitrate. |
| 18 | ,, | ,, | ,, | ,, | 35 | ,, | ,, |
| 32 | ,, | ,, | ,, | ,, | 30 | ,, | ,, |
| 51 | ,, | ,, | ,, | ,, | 20 | ,, | ,, |
| 80 | ,, | ,, | ,, | ,, | 15 | ,, | ,, |
| 130 | ,, | ,, | ,, | ,, | 9 | ,, | ,, |

This supply would suffice, on pre-war world requirements, for about a century.

## Electrical Osmosis

*To the Editor of* THE CHEMICAL AGE

SIR,—I notice in the report of the discussion after the reading of Mr. Highfield's paper on Electro-Osmosis, a very material omission. Sir Herbert Jackson referred to one of our crucibles that had been baked at between 800°C.–1,000°C. and in which fragments of a high-grade fireclay crucible had been placed. Sir Herbert then said that the osmosed clay crucible was heated to upwards of 1,600°C. in an injector furnace, the temperature on the face of the crucible opposite the gas blast being probably 1,650°C. It was at this very high temperature that the fireclay fragments had melted to a glass and the osmosed clay crucible had remained still in a biscuit condition, showing that the intense heat had failed to porcelainise it to the smallest extent. The absence of reference to the high temperature to which the crucible was subsequently heated renders the report incomplete.—Yours, &c.,

The Osmosis Co., Ltd., D. NORTHALL-LAURIE.
36, Victoria Street, S.W.1.
May 26.

### Portland Cement Industry

IMPORTANT DEVELOPMENTS are taking place in connection with the Portland cement industry in the neighbourhood of Port Elizabeth, South Africa. Harbour improvement works are in progress in Algoa Bay, and it is probable that the Portland cement industry will receive considerable encouragement in the immediate future in meeting this local demand alone. A sum of £4,500,000 has been mentioned for the construction of breakwater jetties and port works, out of which £1,500,000 is now being expended as a first instalment. United Kingdom manufacturers of plant, the *Board of Trade Journal* states, should find a ready market in connection with both the Portland cement developments and the Algoa Bay Harbour schemes. One leading syndicate at Port Elizabeth claims to have discovered a large deposit of the limestone, &c., suitable for the manufacture of cement. In fact, the original estimate of available materials for manufacturing cement is now more than trebled.

# British Dyestuffs Corporation

## Chairman's Review of the First Year's Working

SIR HENRY BIRCHENOUGH, who has recently been appointed Chairman of British Dyestuffs Corporation in the place of Lord Moulton, who resigned on account of the pressure of judicial duties, presided at the first annual meeting of the company which was held on Friday, May 21, in Manchester.

After conveying the thanks of the company to Lord Moulton, who will continue to place his knowledge and experience at the service of the board, the chairman said that the year under revision was in no sense a normal year, and its results did not afford any real indication of the earning capacity of the undertaking in the future. Several important facts had affected adversely the operations and the profits of this particular year. Some of these disturbing factors were, he hoped, temporary, while others were of a more enduring character. The Armistice, which was declared early in the company's financial year, created an entirely new situation, and rendered necessary an immediate and large scheme of re-organisation in order to effect the turnover from the work of war to the work of peace. The company had plants which, during the war, had been making munitions, and which had to be changed and adapted in order that they might produce materials required in the dyestuff industry. A turnover of this kind involved great expense, a very material loss in production, and a considerable amount of dislocation of employment among the workpeople, who had to be transferred to different classes of work and to new positions. In response to a national appeal from the Government they had to retain their workpeople in some sort of employment until they had found new positions for them. This was, undoubtedly, necessary from the point of view of public policy, but it did not conduce to economy. The adaptation of existing plant and the re-arrangement of employment in connection with the workpeople were practically completed.

### Non-Delivery of Plant

In the next place, the programme of new construction and general development, which was already in progress at the works of both Levinstein, Limited, and British Dyes, Limited, at the time of their amalgamation, was seriously handicapped—and continued to be seriously handicapped—by the great difficulty and delay attending the delivery and installation of new plant, and the schemes of development inaugurated by the boards of the two companies and amplified and extended by the new board of the British Dyestuffs Corporation, had made slower progress than would have been made in pre-war times. Meanwhile, until the whole scheme of construction was more nearly completed some of their plant would inevitably remain in an unfinished and unproductive state, and a portion of the company's capital would remain temporarily unremunerative. Another matter which affected the result of the year under review was the continuous rise in the prices of raw materials and in the remuneration of both wage-earning and salaried staffs. From the first the company were so anxious not to hamper in any way the textile industries in their efforts to cope with the revival of trade which followed the Armistice that they did not put up the prices of their finished products at as early a stage as they might have done, and perhaps ought to have done. It was only under the pressure of further large advances in the costs both of raw materials and of labour that they found themselves compelled during the present year to increase considerably their scale of prices. Even now the prices of dyes had been increased in a less proportion than the prices of, say, woollen, cotton, or silk yarns, and the proportionate cost of dyestuffs per yard of finished goods was, he believed, less than before the war.

### National Defence

Referring to the national importance of the dye-making industry in both war time and peace time, Sir Henry said their industry was not an ordinary industry, and the shareholders who invested in it were not investing in an ordinary industry, nor were the thousands of people employed in it devoting their time and energies to an ordinary industry. They were contributing their share to the establishment and maintenance of a great instrument of national defence—defence of the Empire in time of war, defence of Imperial trade in time of peace. The position the dyestuff industry occupied in the life of a modern civilised nation was unique. It was fundamental, both in peace and war, and its success was inextricably bound up with the success of the nation in both industry and arms. "I believe," he said, "it is almost impossible to over-estimate the value of the German dyestuff industry to the German Government in the recent war or the power which the industry placed in the hands of our enemies to prolong the conflict. Whether considered as the means by which the Germans were able to counterbalance the effect of the blockade on the manufacture of high explosives or as the means by which they were able to revolutionise warfare by the introduction and use of those toxic substances which added so much to the horrors and destructiveness of war, the German dyestuff industry was an institution of supreme importance. I am informed that, with one single and insignificant exception, the whole of the poison gases used by the German Army were made in the establishments of the German dye manufacturers. What they have done in the past they could perfectly well do again in the future, so long as their dyestuff factories remain intact and their dyestuff industry maintains its world-wide importance. If in course of time another great war should come upon us—and in spite of all our efforts and hopes we cannot guarantee that it will not—we must be prepared for further great developments of chemical warfare. That means it is of absolutely vital importance that we should have in this country great industries so completely endowed with chemical knowledge and practice and so efficiently equipped with plant that they can at once be employed to meet readily and amply the requirements of national defence."

### Security of British Trade

Turning to the question of the equally important aspect of the dyestuff industry as an essential element in the defence of British trade, the Chairman said the group of textile trades of this country constituted the most striking and important single group of allied industries in the civilised world. It was only necessary to look through the export returns to see that whatever else we send or do not send over-seas we ship textiles in varying quantities to every country on the map. Quite apart from questions of employment for our people at home or profit for manufacturers, it must be realised what an influence the export of textiles must have upon the exchanges—an influence in our favour where exports were large and to our disadvantage if and when they were seriously checked. And yet the magnitude and very existence of a very large part of our export trade in textiles depended absolutely upon there being, at all times, a sufficient supply of dyestuffs available for the use of the trades. Dye-making was indeed a key industry, a comparatively small industry upon which other very large industries absolutely depend for their very life. "I am quite aware," Sir Henry said, "that the textile trades complain that they are not obtaining an adequate supply of dyestuffs, either in quantity or variety, from the British Dyestuffs Corporation and other British makers. I know it is most tantalising at a time of unexampled demand from all over the world—especially when there are so many other difficulties connected with labour and plant to contend with—to be kept waiting for essential dyes or to be confined to limited ranges in insufficient quantities. But while fully admitting all this and expressing my sympathy, I ask dye-users to consider what would have been their position if the suggestion, not infrequently made during the early years of the war, had been adopted, namely, that we should await the termination of hostilities and then resume our old position of practically complete dependence upon German supplies. What would be the position of the textile trades at the present time if that policy had been adopted? You would be receiving from British sources such dyestuffs, or perhaps rather more than you were receiving in 1913, a certain limited quantity from Switzerland, and from Germany next to nothing compared with your requirements. It is because British dye manufacturers were encouraged by the Government, and, in

particular, because this great company was formed and fostered, that you have received supplies of colour which, with all their deficiencies, have enabled you to take advantage of the present almost unlimited demand for your goods and enjoy a period of unexampled prosperity. I hope our friends the dye-users, will remember that, owing to our efforts, they have on the whole been better supplied with dyes than any country in the world."

### A Programme of Research and Construction

The object the board was keeping before them was to establish and develop a great organisation which would supply the needs of British consumers of synthetic dye-stuffs, and protect them from the menace which would arise from a return to dependence upon some foreign source of supply. The problem was a big one and a difficult one: its solution would require time and patience, and all the aid that science and technical skill could give. They had prepared and were carrying out a programme of both research and construction which they believed would enable the company to achieve the great objects for which it was formed.

"If we are to solve the problem we have undertaken we need the very best brains we can find," the Chairman said, "both in the departments of research and in the department of chemical engineering. This is essentially the age of the application of science to industry. The old rule of thumb methods are a thing of the past. I do not for a moment mean that we do not require experience and acquired skill in the application of the results of research to actual processes of production. We need that as much as ever, and, as a matter of fact, it was in experience and acquired skill in processes of production that a large part of the success and strength of the German dye-makers lay. But research undoubtedly lies at the very root of the solution of the problems we are engaged upon. We have, I believe, under the general direction of Dr. Herbert Levinstein, our technical managing director, the largest research organisation in Great Britain. We include within it some of the very finest scientific ability which can be obtained in this country. Our research department at Blackley is under the charge of Mr. A. G. Green, a Fellow of the Royal Society, who has been associated, in a most distinguished manner with the British dyestuff industry for many years. The department at Huddersfield is controlled by Dr. R. Robinson, who is also a Fellow of the Royal Society and one of the most brilliant of the younger generation of English chemists. We are also employing about 100 chemists of high attainments, who are continuously engaged on research, and our scheme contemplates a systematic survey of the whole field of dye manufacturing. Much of the field, I am glad to say, has been covered and processes prepared which serve as a guide to our constructional departments.

"Such work, though absolutely essential, is costly. We have constructed or have under construction buildings and equipment to the value of nearly £250,000, whilst over £70,000 was spent in the actual operation of the research department during the year under review. With this organisation we feel satisfied that we shall be able to solve in time the many difficult technical questions which present themselves. I should mention that, until our new laboratories are completed, we are maintaining research colonies in certain universities, where we still continue to receive the benefit of the advice of the eminent representatives of chemical science in those institutions. The Corporation has received from the Government, for research purposes, the sum of £100,000, which was promised to British Dyes, Limited, on the creation of that company.

"It cannot be denied that the British dyestuff industry, as a whole, and the undertaking of this corporation in particular, have made very substantial progress indeed in the last five years. I have only to tell you that we are employing nearly 6,000 workpeople, and that our total staff is over 7,000, to enable you to realise the scale on which we are operating. The British dye industry to-day is really large and important, and its output exceeds the total consumption in this country before the war. Moreover, the output is almost entirely based on British-made materials and intermediate products. We have made a big beginning, and, so far as we are able, we shall endeavour to fulfil completely the task which we have set ourselves of establishing a British dyestuff industry which will adequately meet the requirements of the industries of which we are in effect the servants. I must point out to you that we are working in an epoch in which the conditions of industry are abnormal. Workpeople are adjusting themselves slowly to new conditions; the supply of raw materials is complicated by the appearance of new requirements; an unprecedented demand for finished dyestuffs prevents the creation of stocks, and thereby places difficulties in the way of the maintenance of uniformity in our products."

### Problems of Organisation

"The amalgamation of our own two great establishments at Manchester and Huddersfield has created problems of organisation which can only be solved slowly. We are, however, working steadily to our programme. Our production and the variety of our output is being gradually extended, and we look forward to the time when supply will adjust itself to demand. It would be foolish to suggest that until that time arrives the great consuming industries of this country and of the British Empire should not be allowed to avail themselves of supplies from other countries, supplies which, I hope, will diminish in quantity and variety as the company's output increases. I am sure, however, that there is no one who would not view with the very gravest misgiving the re-establishment in this country of those alien organisations uprooted during the war, which we believe were a menace in peace, and which have proved themselves to be a real danger in war. Whilst foreign supplies may be necessary for a time, I think we have a right to ask in the national interest that such supplies shall only be imported under some system which will guarantee that the danger of complete or partial foreign monopoly shall not re-appear.

"The Government's fear of the danger of their revival is by no means illusory. The unexpected Sankey judgment has rendered possible, for the moment, the free importation of dyestuffs from Germany. Already representatives of German firms are making offers to dye users, and, it is said, are taking a large number of orders. It is true that the actual deliveries are relatively small, but an effort is being made to re-establish the old connections. In view of the definite promises which were made by Ministers in the House of Commons that this great national key industry should be given a reasonable period during which it could take root and establish itself on a sure and permanent basis, we have a right to look to the Government for the immediate fulfilment of their promises, and there is not a moment to be lost. In my opinion those promises can only be effectively fulfilled by the prohibition of foreign imports of dyestuffs except under licence. I am aware that the working of the widespread licensing system rendered necessary by the war has made the idea of licensing unpopular, but there is no reason that I know of why it should not work smoothly and satisfactorily in this industry, if the users of dyes will co-operate and determine to make it work. What is wanted in the national interest is a system of control under which the requirements of dye users will be properly met, while the danger of any return to complete or partial dependence upon alien sources of supply will be guarded against.

"I can assure you that we have given all the matters to which I have referred our most careful attention, and, while we do not seek to minimise the difficulties of the future or to treat lightly the problems with which we are confronted, we feel that, given your confidence and the support which we believe we have a right to ask from the dye users, we shall succeed in the task which is before us. I would like to add that we need in addition the full and loyal support of our staff. Here I should like to say just a word or two to express the grateful appreciation of the board and also, I am sure, of the shareholders, of the devotion and loyalty and labours of all our staff, both at the works and the central offices during the past year."

The resolution "that the report of the directors and the statement of accounts for the year ended October 31, 1919, be received and approved, and that a dividend at the rate of 8 per cent. per annum (less income-tax), be paid on the Preferred Ordinary shares," was seconded by Sir Harry McGowan, and passed unanimously. Mr. W. H. Aykroyd and Sir Harry McGowan, K.B.E., were re-elected directors, and Messrs. Thomson McLintock were appointed auditors for the current year.

# The Chemist in Politics*

## A Plea for Improved Economic Conditions

ONE'S first impression on approaching such a subject as "The Chemist in Politics" is that the profession is composed of a singularly individual body of men having no co-operative policy. It is because of this lack of cohesion amongst chemists that chemistry has not hitherto been recognised as one of the great professions, hence the neglect in the past of the prosecution of research and development of allied key industries. This non-recognition of chemistry as one of the great professions has resulted in its failure to attract the best brains, in consequence of which law and medicine recruit a number of men who might otherwise be favourably disposed to enter the chemical profession.

### Defects in Patent Law

The need for the Parliamentary representation of chemists may be seen in the shortcomings of recent legislation affecting the chemical trade, as in the instance of the question of patents. At one time foreign firms could patent their processes in this country without being under any obligation to operate them here, which resulted in the establishment of foreign monopolies. About 1907 partial revision of this anomaly took place, largely at the instance of the late Dr. Ivan Levenstein, whereby foreigners were obliged to produce the finished product in this country. But in the case of dyes, as an instance, this merely meant that they could import the finished intermediate, and couple them up here, which in many cases is the simplest operation of all.

Had the Patents Acts been framed on a broader basis, which undoubtedly would have been the case had the chemist been represented, large factories would have been established for the production of the difficult manufactured intermediates. This would have involved the erection of a different class of chemical plant, necessitating the evolution of the chemical engineer, who would have become a recognised force in chemical industry, thus putting an altogether different aspect on our country's position of 1914. In 1915, we should not have found ourselves in the ludicrous and ignominious position of having to go abroad for such plant as that devoted to the distillation of glycerine, the recovery of solvent, and the manufacture of ether, no doubt involving the heavy payment of royalties. Had chemical representation been an established fact the State would also have offered greater encouragement to our universities to attract the best men into the chemical profession.

### German Enterprise

One can go back over the last 75 years and see what progress might have been made in the interval. In 1844 the famous German chemist Baron Von Liebig toured this country, and owing to the enthusiasm of the Prince Consort the College of Chemistry, now the Royal College of Science, was established. The brilliant young German Hoffman was invited to become its first professor of chemistry, and in his laboratory in Oxford Street Perkin discovered his first aniline synthetic dyestuff, a circumstance to the outcome of which Germany owed much of her pre-war prosperity, which in a few years would have given her world-wide commercial control. What would have been England's position in 1914 had the movement initiated in 1845 received continued stimulus?

The need for political action by chemists is also exemplified in the condition of some of our towns and cities, owing to the smoke nuisance and the presence of noxious vapours, much of which of the latter is due to the inefficient and wasteful chemical plant in use. In referring to the inefficient plant it has been a common sight when passing chemical factories to observe clouds of nitrogen oxide gases escaping into the atmosphere.

### Education of Fuel Technologists

The education of fuel technologists as a class and their appointment as directors of fuel economy in our factories is a present-day necessity, not only from the point of view of the conservation of fuel, but from the health standpoint and the saving of valuable by-products which often enough are allowed to pass to waste and so pollute the atmosphere. As an instance of the latter one may mention the belated establishment of by-product coking plants. The short-sightedness of our policy is again exemplified in the employment, until recently, of the beehive coke oven. It was not until the Germans made an offer to our colliery owners to install gratis by-product coke ovens plants, with the only recompense that they should take the valuable by-products and allow the colliery owners to retain the coke, that the obsolete beehive coke oven has been done away with.

### Salaries and Conditions

Coming to the more personal economic side of the chemical profession one must recognise that it is impossible to induce the best brains to enter the chemical profession because of the low monetary remuneration. In 1915 we had the spectacle of a Government Department advertising for chemists of university standing with honours degrees or equivalents to accept appointments at a wage of £2. 0s. 6d. per week, the 6d. being magnanimously given to meet the National Health Insurance charge. Later, strenuous efforts were made by the chemical heads of the Ministry of Munitions to better the conditions and to obtain minimum salaries of £200 per annum. The powers that were at the time demurred to this, and offered £150 per annum, and not until the heads refused to engage chemists and threatened to throw the responsibility on to the Treasury was a compromise of £175 per annum effected. It is little wonder, then, that one found in the latter pre-war days university professors advising promising graduates not to accept such appointments.

The growth in the power of organised labour forced the establishment of the Whitley Councils to settle disputes between capital and labour. The chemist, on whose brains so many industries are dependent for being carried on at all, is unrepresented on these councils, which at present would appear to offer the only hope of his compelling adequate pecuniary reward for his work. It seems ludicrous that the Institute of Chemistry should have to seek representation on an Industrial Council before it can attempt to aid the professional men it represents. The conditions of appointment for chemists in industry require revision in many cases. Usually a man is required to sign a three years' agreement, and among the conditions often embodied are, first, that if he leaves the company after the expiration of the agreement or for any reasons before it his former employers have power to refuse permission for him to join another firm making similar products for a period of from one to three years. They agree to pay him what is, in many cases, a totally inadequate compensation (sometimes about £3 a week), he on his side having to agree to pay £6 or £7 a week to the company if he joins another concern in spite of permission being refused. Secondly, if he makes any discovery or improves any existing process he is in many instances obliged to agree that anything of this nature shall become the property of his employers to be patented at their discretion in his name and theirs, but without any payment to him or royalty or percentage of profits. He must agree to remain, therefore, entirely dependent on the goodwill of his employer for any reward, and, perhaps, in numerous cases the employer will say, untruthfully, "Not worth it."

Were chemists powerfully represented in Parliament these and other unfair conditions could be rendered illegal and the prospects of the industrial chemist so improved that many more promising students would enter the profession every year, inevitably assuring our position as a chemical nation.

* A paper read by Mr. T. H. Gant, A.R.C.S. (Lond.), A.I.C., before the Gretna Section of the Institute of Chemistry.

### Recent Wills

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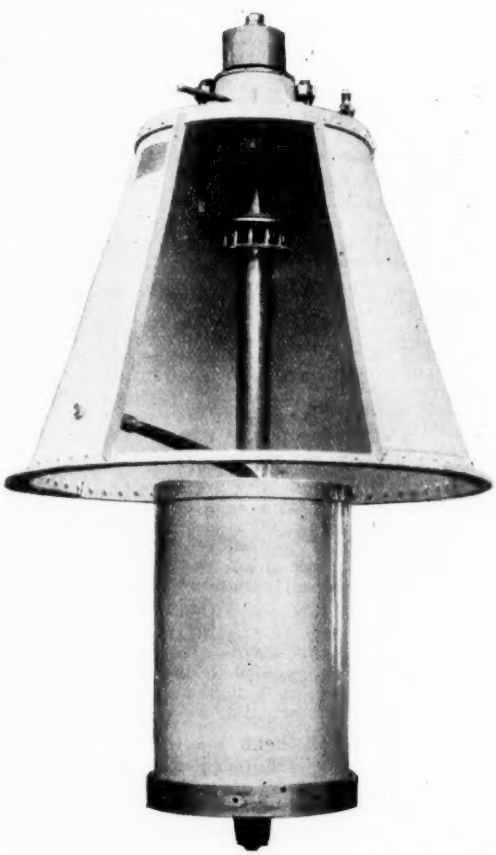
|---|---|
| Mr. H. Woolley, of Fairhill, Broughton, Manchester, chairman of James Woolley, Sons & Co., Ltd., manufacturing chemists (net personalty, £127,040) | £129,384 |
| Mr. J. Baxendale, of Blackburn, oil and tallow refiner | £9,613 |
| Mr. C. L. Hughes, of Abercarn, Mon., chemist | £4,814 |
| Mr. H. G. Turner, of Staplegrove Manor, Taunton, and of Sloane Gardens, London, the pioneer of the manganese and magnesite industry of India (net personalty, £357,579) | £386,158 |
| Mr. M. P. Ismay, of Newcastle-on-Tyne, manufacturing chemist | £65,300 |
| Mr. D. Charles, of Burry Port, Carmarthen, chemist | £4,402 |
| Mr. A. B. Smith, of Glossop, Derby, manufacturer, and bleacher | £100,973 |

## Gee Centrifugal Separator

### Film Taken for Dominion Touring Exhibition

WE give below an illustration of the Gee Centrifugal Separator, which, as briefly announced in our issue last week, was shown in operation on a film in the Cinema Room, at Vickers' House, Westminster, on Thursday, May 13. The film was taken for the Department of Overseas Trade in connection with the Dominions Touring Exhibition.

The Gee Centrifugal Separator was built for Centrifugal Separators, Ltd., by Messrs. Vickers at their Barrow Works. All machines before being despatched are tested with whiting in suspension in water, and the film was taken during such a test on one of the 36 in. machines. Whiting is chosen because it is a difficult material to separate from water by any other means than the employment of settling tanks. Owing to the colour it also indicates leakages and defects in construction, enabling these to be corrected before packing. Incidentally, it was found to be an excellent material for showing up in photographs and illustrating the methods of collecting the cake on the residuum plates.



The machine was first shown at rest, with its drum below the ground level, suspended by its special bearing which enables a weight of 2½ tons to be rotated at 1,000 revs per min. with no risk of processional oscillations. The container holding the residuum plates on which the cake is deposited was shown hoisted above the ground level by the lifting gear attached to the machine. The next operation was the placing in position of the residuum plates. As the container was lowered into the drum the machine was started, the lifting attachment disconnected, and the feed-pipe directed into the drum. Even on the film the absence of any sign of "wobbling" of the shaft was very noticeable, and in practice it is found that quite a considerable out-of-balance of the drum will not cause the machine to run out of truth. The picture then showed the feed cut off, machine stopped, container lifted and the residuum plates removed, each with a thick cake of deposited and graded whiting.

## Non-Ferrous Mining

### Proposed Centralised Control of the Industry

THE report of the Departmental Committee appointed by the Board of Trade to investigate the non-ferrous mining industry was issued as a White Paper on Tuesday.

The Committee state that they have confined their attention to the ores of tin, lead, and zinc, and the minerals associated with them—namely, the ores of tungsten and arsenic, barytes and fluorspar. With regard to the non-metallic minerals produced in the United Kingdom—china-clay, china-stone, fire-clay, brick-clay, fuller's earth, ganister, silica-rock, refractory sands, gravel, limestone, dolomite, chalk, building stone, slate, road metal, chert, flint, bathstone, gypsum, phosphate of lime, sulphate of strontium, salt, mica, soapstone, alum-shale, oil-shale, lignite and coal, it was decided not to deal with these in this report, on account of the urgency of the case presented by the tin, lead, and zinc miners, and the necessity of reporting at an early date.

Dealing with the production of black tin, it is pointed out that the future of tin-mining in Cornwall depends in a great measure on the finding of new ore-shoots by lateral development on the lodes now worked, or by cross-cutting from existing workings to other known lodes, some of which in their shallower levels were large copper producers. Regarding lead and zinc ore, the report states that at the present price of the metal lead-mining should be a profitable undertaking, and some material increase in production may be looked for. But it will be a considerable time before this can be effected, either by carrying out projected drainage schemes or by making up leeway in the development of existing mines, which, owing chiefly to the lack of labour during the war, was allowed to get seriously behind. Some abandoned mines will probably also be re-opened. The chief hope for the modern lead-miner is in the exploration of those portions of the Mytton beds in Shropshire, which, owing to their occurrence in a trough, are concealed by a covering of Stapeley ashes and Hope shales, and have been left untouched.

The present outlook for zinc mining is discouraging, since mines that are mainly dependent on blende production are not able to make a profit at current prices for the ore. The low price obtainable for home-produced blende is due mainly to the high smelting costs prevailing, but the purchase by the Government of the annual production of the Broken Hill Mines was considered by many witnesses to be a contributing cause. They asked the Government, therefore, to place the home ore on the same basis as to price as the Australian concentrates delivered in this country.

The high prices realised for tungsten ores and arsenic-ore during the war were of great assistance to the tin-mining companies producing them; but, with one exception, these mines scarcely reached the productive stage, and at the present market price for the ore they cannot be worked at a profit. The home production of tungsten ores amounted in 1918 to 302 tons, or about 1 per cent. of the world's production.

#### A Mines Tribunal

One of the principal recommendations of the Committee is that the various duties relating to the mining of minerals other than coal (now entrusted to a number of departments) should be centralised in one organisation. It would become a sub-department of the Mines Department, comprising all mining, including coal, so soon as such a department is created, but it should retain its individuality. In order to ascertain and keep in close touch with the technical position of metalliferous mines, to offer advice in regard to the improvement of existing methods or the initiation of new schemes of development, and, in particular, to advise as to Government action in appropriate cases, it is recommended that the existing Mineral Resources Development Branch of the Board of Trade should be expanded and furnished with a suitable technical staff, including mining engineers and mining geologists, with a view to its ultimately forming one of the sub-departments of a new Mines Department.

An important section of the report deals with mineral leases, wayleaves, easements, barriers, right to support, &c. On these subjects it is recommended that any party desirous of obtaining a mineral lease or of obtaining a modification of an existing lease, should, in the event of disagreement, have the right to refer to the Mines Department for their decision.

In the event of any party being dissatisfied with the decision made by the Mines Department, there should be a right of appeal to a Mines Tribunal, whose decision should be binding and final.

The Committee further recommend that where an owner or lessee refuses to accept any recommendation made by the Mines Department, which that Department considers essential to prevent the loss of minerals to the nation, the Mines Department should have power to make such compulsory order as it may deem necessary to meet the case, subject to appeal to the Tribunal.

### State Aid Recommended

In regard to State aid to mining, the Committee advise that the Government should take powers, analogous to those in force in the Dominions, to extend financial assistance, on the advice of the Mines Department, to mining companies to enable them to tide over their difficulties or to undertake approved exploration or development; and that the funds at the disposal of the Development Commissioners should be made available for this purpose.

The Committee also recommend that the Government should be prepared to purchase, if called upon to do so, the blende production of the zinc mines of the country, at a price equivalent to the cost of the Australian concentrates, plus £1 per ton to cover the greater value to the smelters of British ores.

Attention is directed to the advantage which would accrue to the districts concerned if greater assistance were given by way of scholarships to promising youths in primary or secondary schools to enable them to pursue mining studies as full-time students, in the mining schools of the country. It would appear that the value of the scholarships at present offered is not sufficient to enable a promising boy to avail himself of the advantages offered.

## British Cotton and Wool Dyers

### Colour Users' Satisfaction with Home Dyes Supplies

MR. A. HOEGGER (chairman), presiding at the annual meeting in Manchester on Friday, May 21, of the British Cotton and Wool Dyers' Association, reviewed the dye situation from the British consumers' standpoint, and testified to the satisfactory progress recently made in this country.

During the past year (he said), there has been much discontent among colour users regarding the inadequate supply of dyestuffs, and British dye manufacturers, as well as the Government, have been severely criticised on this account. Taking into consideration the complexity of the problem, however, we have no hesitation in saying that British makers of dyes have achieved remarkable results, and we acknowledge our indebtedness to the great efforts they have made to meet a most difficult situation. Even those well conversant with the industry would scarcely have thought it possible that in the course of a comparatively few years and under the most difficult conditions prevailing, not only during the world-war, but also since the Armistice, such as industry as we have to-day could have been built up.

The encouragement given by Lord Moulton when addressing a representative meeting towards the end of 1914, and the help given by his lordship since, as well as the ready assistance rendered by the Board of Trade whenever appealed to, have borne fruits which scarcely could have been anticipated by the most optimistic of colour users. Still, we are a very long way from what is required to maintain the pre-eminence of our huge textile trades, and to meet the demands made upon us by millions of consumers all over the world in regard to colour effects, and the variety of shades, brilliance, and fastness so much admired and in such great demand by all peoples. No users of dyes, with the possible exception of the Calico Printers' Association, in this or any other country, require a larger variety of brilliant and fast dyes than we do, and had it not been for the Swiss dyes available and the timely arrival of some reparatio1 colours quite a number of our branches would have suffered heavily, and the disappointment caused to many of our customers in consequence of delayed deliveries of their goods would have been still greater. Some customers had to wait for months before we were able to deliver their goods in the colours ordered, and up to a million pounds weight of cotton, worsted and woollen yarns and slubbing were held up until supplies of suitable dyes were obtainable. No doubt the exceptionally large demand for dyes, combined with the scarcity of intermediates required in the manufacture of the same, has also been a considerable factor in the short supply. It is of the utmost importance that every encouragement should be given to British makers, but until demands are more fully satisfied it is generally recognised that certain colours must necessarily be imported in order to enable dye users to carry on their work.

### The Sankey Judgment

Since the Sankey judgment, in December last, there have been no restrictions on the import of German colours, and many dyers have naturally availed themselves of the opportunity thus offered of obtaining supplies from this source. The restrictions which previously obtained for a short period may be reimposed on individual purchases in some form or other at any time. The advisory committee of the Colour Users' Association have strongly advocated collective buying on behalf of all colour users, the purchases to be handled by the Central Importing Agency under the advice of this committee. The purchasing committee who went to Germany in January last were not able to buy extensively on account of the available stocks being small. The first consignment of these colours has arrived and will be distributed shortly. Only a comparatively small proportion of German colours to which Great Britain was entitled under the Reparation Clauses of the Peace Treaty has been received, and a still smaller portion actually distributed. We have received certain allotments, and the dyes, which were of good standard quality, have helped us considerably in fulfilling outstanding orders which had been held up for lack of the necessary colours to dye the goods.

According to the *Board of Trade Journal*, British colour manufacturers are now producing a greater amount of dyestuffs than the total weight consumed in this country immediately before the war. This in itself is highly satisfactory; but that it does not meet present requirements is clearly shown by the general outcry for more and a greater variety of dyes. For one reason, the demand has increased enormously, and, moreover, a great proportion of the 25,000 tons now said to be made annually are not as highly concentrated as were pre-war German colours.

It is well known that colour manufacturers are still suffering from a shortage of intermediate products, and steps are being taken to bring about a closer union between colour makers and British chemical manufacturers with a view to relieving the situation. I have myself persistently advocated during the whole period that the first step towards building up a successful dye industry in this country was the formation of an establishment (with Government aid) for the manufacture of intermediate products. I have no doubt if dye users in this country will give their full support to British makers, a synthetic dye industry will gradually be established second to none in the world.

### The Midland Glass Trade

THE strike of Midland canal boatmen last week seriously affected the glass makers in Birmingham and the Black Country. It takes a month to restart a glass furnace if the fire goes out, and those in charge of glass houses are striving very hard to avert such a dangerous interruption of their activities at a time when they are inundated with orders from customers at home and abroad. The fuel consumption for a nine-pot glass furnace amounts to 30 or 40 tons a week, according to the class of work in hand, and with fuel stocks low the position last week was most acute, but, with the dispute over, normality should soon result. Midland flint glass makers are now feeling the impulse of the prevailing energy in the shipyards. Shipbuilding and the reconditioning of old ships is bringing in an immense amount of business, and there is a brisk inquiry for table wares, lighting glass and decorative glass. Another interesting fact is that Midland glass manufacturers are maintaining their hold upon the manufacture of electric bulbs and rods. This department of trade was, prior to the war, largely in the hands of the foreigner.

# Naphtha or Tar Oil

## Decision in Favour of Railway Companies

JUDGMENT was delivered on Thursday, May 20, by the Railway and Canal Commission on the action brought by the Midland, the Great Western, and the Lancashire and Yorkshire Railway Companies against Brotherton & Co., Ltd., and Wm. Butler & Co. (Bristol), Ltd. The case was of considerable importance to railway companies and the consignors of coal tar products, especially that known commercially as heavy naphtha.

### Judgment

Mr. JUSTICE LUSH said that the dispute between the railway companies and the two firms in this case related to the conveyance of heavy naphtha, which had for very many years been consigned by the two firms, and, as they said, was properly consigned, under the description of "mineral tar oil." The applicants, the railway companies, said that the products, the real character of which they had now ascertained to be heavy naphtha, came under the description of "dangerous goods" in Part IV. of the Rates and Charges Order Confirmation Act, and that they were accordingly entitled to charge a reasonable rate for its conveyance. The defendants, the two firms, had denied that the products were dangerous goods at all or that the railway companies were entitled so to treat them and they refused to pay the rate charged. Their contention was that the goods were specifically described in the Statutory Classification as "mineral tar oil," which was expressly treated as non-dangerous and was classified. Each of the railway companies, since the dispute arose, have had some consignments of the product analysed. There were about 20 samples altogether and the results were in evidence. The companies claimed a declaration to the effect in substance that they were dangerous goods, which was resisted by the defendants.

The Court had had a great deal of evidence, not only of the process by which the various spirits of oils were obtained by distillation from coal tar, but of the products themselves, and their different characteristics and the descriptions or names given to them by those who dealt commercially in them. It was clear on the evidence of the defendants' witnesses themselves that the expression "mineral tar oil" was not the commercial description of one specific product or oil, but was a generic term which embraced a great many different specific products. One witness, called for the defendants, admitted that benzol, a highly inflammable and dangerous product, was a mineral tar oil, and so was creosote, an admittedly non-dangerous oil. And it was also admitted that if a customer asked to be supplied with mineral tar oil the supplier would not know without some further description what goods he wanted.

He thought it was clear that the meaning of the words in the statutory classification relating to oils was that any mineral tar oil that was not dangerous was to be placed in the class there mentioned and charged for accordingly.

### "Dangerous Goods"

The next question to consider was whether these products were "dangerous goods" within the meaning of Part IV. of the Rates and Charges Order Confirmation Act, and "dangerous" oils within the meaning of that part of the statutory classification relating to the conveyance of oils. Now, what did the word "dangerous" in those two documents mean? Did it mean dangerous in fact, in which case that Court, or whatever might be the tribunal which had to deal with the question, would have to decide it as a question of fact, or did it mean goods which, for the purposes of fixing the rate, must be treated as dangerous goods. The applicants, the railway companies, while not shrinking from the issue whether they were dangerous in fact—indeed they had, as the defendants had, pressed the Court to decide the question as one of fact—contended that it was for the railway company to decide what goods were dangerous, and they said that, as they had *bona fide* come to the conclusion that those samples were dangerous goods, they came properly and necessarily within that class for the purpose of fixing the rate for their conveyance. He thought that that contention was right.

The Legislature from the earliest times in the history of railway legislation quite clearly left it to the railway companies to decide what goods were dangerous, and enabled them to refuse to carry any goods which, in their judgment, were dangerous. It was obvious why the question as to the dangerous or non-dangerous character of goods tendered for conveyance was left to the company. The term "dangerous" was a relative term. It was not defined and it was difficult to define it.

Now, had the Legislature, in using the term "dangerous" in the Statutory Classification and in the Rates and Charges Order Confirmation Act, removed the discretion from the railway companies and left the question to be decided in each case as a question of fact? He could not feel any doubt as to the proper answer to that question. It was clear that no such change in the law was intended. If it were, Section 105 of the Railway Clauses Consolidation Act, 1845, would wholly or partly be repealed. A statute could only be repealed by implification if such repeal was necessarily and clearly intended, and he thought that it was clearly not so intended. The Legislature, in speaking of dangerous goods, and oils, not dangerous, was dealing with goods for the purpose of enacting what rate should be charged for their conveyance, and no alteration in the mode of deciding which goods came within that class was intended. That question would still be decided by the same authority that decided it before—namely, the railway company. The company must of course exercise a *bona fide* judgment which he assumed meant upon some reasonable evidence or reasonable grounds on which to exercise it, but if they had acted *bona fide* in that sense it was not in his view competent to that or any other Court to override their decision.

The last question to consider was whether the railway companies had acted *bona fide* and on reasonable grounds in holding these samples to be dangerous. There was no doubt that they had, and there was no ground whatever for contending the contrary. The way in which the heavy naphtha had been dealt with in the Railway Classification before 1892, and the evidence of the experienced witnesses who had been called before them, made it perfectly clear. That product had, for very many years, been scheduled as "dangerous" and special provisions had been made for its consignment and storage. It was not so dangerous as solvent naphtha and was put into a different class from solvent naphtha, but they had both been treated as dangerous for a long period of years.

The defendants strongly relied on there having been no accident in the carriage of these goods when not properly declared, but that was only one element to be considered. The companies might have been fortunate in not having an accident. The fact that none had occurred did not prove that there was never any risk. In his opinion, the applicants were entitled to the declaration which they claimed, but he thought it should run as follows:—"A declaration that the traffic mentioned in the Schedules to the application is naphtha coal tar, and that the applicants are entitled to treat such traffic as dangerous goods within the meaning of Part IV. of the Schedules to the Midland Railway Company and the Great Western Railway Company (Rates and Charges) Order Confirmation Acts, 1891, and the Lancashire and Yorkshire Railway Company (Rates and Charges) Order Confirmation Act, 1892."

Mr. TINDAL ATKINSON, K.C., and Mr. MACNAMARA agreed.

## Naphtha Vapour Explosion

A DISASTROUS explosion and fire, involving the death of five workmen, occurred at the Para Mills of the Dunlop Rubber Company, Aston Cross, Birmingham, on Friday May 21. Several other men were burned about the face and body. The explosion occurred in what is known as the "spreading" shed. A broad sheet of canvas which had been treated with rubber solution was being passed through the drying machine, and about 14 men were engaged in this operation. Without any warning there was an explosion of naphtha vapour, and the clothes of the men were ignited. The canvas sheet also took fire. Every precaution against fire is taken by the company. It is believed that the explosion was caused by a spark which was generated by friction.

## Cheap Method of Liquid Hydrogen Production

A ROME message says that Dr. Pasticci, a noted chemist, has discovered a cheap method of producing liquid hydrogen, which may be used in driving automobiles, one gallon being sufficient for 250 miles.

## Auramine as a Sensitiser

AT a recent meeting of the Royal Photographic Society of Great Britain, Messrs. O. Bloch and F. F. Renwick, in a paper under the above title, said that the use of auramine in photography had been practically restricted to the preparation of yellow filters, but even for this purpose it was abandoned on the introduction of the more stable Filter Yellow K and its successors. It had also been suggested for use in self-screened orthochromatic plates, but so far as they were aware such plates had never appeared on the market. About nine years ago, in the course of researches on the production of colour-sensitive plates by the bathing process, they found that a little advantage was usually to be gained by the employment of small quantities of auramine in the dye-bath. No use was made of the observation for several reasons, the chief being that it was found possible to produce still better results by employing a very dilute aqueous dye-bath (1 : 500,000) nearly saturated with pure quinoline (approximately 3 : 1,000) and giving the plates an immersion of several hours before rinsing and drying.

During 1918 many hundreds of experiments were made in the course of a comparative study of a number of sensitizing dyes, both old and new, which Sir William J. Pope and Dr. W. H. Mills were preparing at Cambridge. These experiments were not restricted to the bathing method but included also the second well-known means of conferring colour-sensitiveness, viz., addition of the dye solution to the emulsion just prior to coating. At that time it was urgently desired by the authorities (particularly by the R.N.A.S.) that a much faster and more colour-sensitive plate than anything available should be prepared for aerial photography, and in endeavouring to meet this demand a very large number of combinations of the available dyes was tried. Auramine was examined afresh, both alone and in conjunction with other sensitisers. Used alone, it had no useful sensitising action on silver gelatino-bromide plates. With gelatino-chloride plates, however, it proved to be a powerful sensitiser for the light blue of the spectrum, a region in which such plates are normally insensitive. If this had been all, there would have been little to induce anyone to trouble very much about auramine as a sensitiser. It was found, however, that auramine when added to a melted emulsion together with one or other of the "isocyanine" class of dyes gave some very interesting and valuable results which eventually were turned to good account in producing the new Ilford panchromatic plates. Hitherto, all mixtures of sensitising dyes had been found to give either simply an average of the effects of the single dyes used or, much more commonly, a result which was distinctly inferior to this average. When, however, an isocyanine such as Sensitol Green (German name, "pinaverdol") or Sensitol Red (German name, "pinacyanol") was used with a small addition of auramine, altogether insufficient in amount to depress the blue sensitiveness by its screening action, it was found a marked enhancement of the sensitising properties of the isocyanine in regions of the spectrum for which the auramine itself did not sensitise in the slightest degree. Moreover, it appeared to be a general property of such combinations for auramine exerted a similar stimulating action on quite a number of new isocyanines, samples of which had been presented by Sir William Pope and Dr. Mills.

In addition to giving improved colour-sensitiveness, addition of auramine in very small quantity had the valuable merits of restraining the fogging tendencies of the isocyanines and of materially prolonging the useful life of the plates. No real loss of colour-sensitiveness with age had been detected, though, as with all gelatine dry plates, the speed of development became slower as the film gradually hardened.

Throughout this paper the term isocyanine is used in its original wide sense covering both the isocyanines proper, and the pinacyanols or quinocyanines derived from them.

### A Ten-year Petroleum Contract

The Deutsche-Americanische Petroleum Co., which belongs to the STANDARD OIL GROUP, has concluded a 10-year contract with the German Government, all business to be on a cash basis. The Imperial Oil Company has filed an oil claim on 20 sections of land south of Consul, Saskatchewan, along Battle Creek. Wells will be sunk immediately.

## Society of Chemical Industry

### Nottingham Section

AT a meeting held on Wednesday, May 19, Dr. E. B. R. Prideaux read a paper on "The Deliquescence and Drying of Ammonium and Alkali Nitrates," in which he stated that the relative humidities or vapour pressures of the saturated solutions of ammonium nitrate were investigated by means of two types of tensimeters, the use of which was demonstrated. The results, as tabulated for the Ministry of Munitions, were applicable to determining the best conditions for drying the salt and also for finding those conditions under which it would deliquesce. The augmenting effect upon this latter property of small admixtures of other salts was clearly proved by similar experiments, and a theory of the deliquescence of mixtures was demonstrated and supported by the results of the work of Lieut.-Col. J. A. Hall, late of the Ministry of Munitions.

A note was then read by Mr. J. M. Wilkie on the reduction of arsenic acid in the electrolytic determination of arsenic. In the method referred to, which had been already described before the section by Mr. Wilkie and his collaborators, the arsenic compound was introduced into the cathode compartment of an electrolytic cell with a lead cathode. On passing the current the arsenic was reduced to arsine, which gave a stain on mercuric chloride paper, which was held by a special clip. If the arsenic were present in the higher state of oxidation a prior reduction was necessary. Various methods which had been proposed to effect this, including the use of sulphurous acid and stannous chloride, were all open to objections. It was found by Messrs. Wilkie and Rice that glycerine was an extraordinarily effective reducing agent, the action being of a peculiar nature, inasmuch as it probably occurred through the intermediate production of a glycero-arsenic acid. Details of the method were given and in the subsequent discussion some reasons were put forward for the loss of arsenic in the method of ignition with lime or other bases. Such loss, it appeared, did not usually occur during the ignition, but rather by co-precipitation of arsenic in the subsequent solution processes.

### Combines in the Welsh Coal Trade

IT is officially announced that a contract has been entered into between Messrs. D. R. Llewellyn, H. Seymour Berry and H. H. Merrett for the purchase of the Crown Preserve Coal Co., Ltd., of Cardiff. The "purchase consideration" is said to approach two million pounds, and will date from July 1. The purchasers already control, with the Graidola, Phœnix and other works a large proportion of the patent fuel output of the country, and the purchase of the Crown Preserve undertaking will give them an output of about 1,750,000 tons a year, or something like 80 per cent. of the total briquetting production. The Crown Preserve Coal Co. is a private undertaking, with works on the dock sides at Cardiff and Port Talbot, and it has its own wharf for the shipment of fuel. The Crown fuel works were the last of the independent works, all the other undertakings having become associated with colliery enterprises.

The Ebbw Vale Steel, Iron & Coal Co., Ltd., are reported to have purchased Lancaster's Steam Coal Collieries, Ltd., which has a paid-up capital of £750,000, and whose output is 1,500,000 tons per annum. The terms of the deal, with which Messrs. T. Beynon & Co., Ltd., are associated, are not disclosed. The Ebbw Vale-Beynon combine now become most powerful in the South Wales coalfield, and the total production from the pits make their control nearly 8,000,000 tons yearly, or 60 per cent. of the output of the Newport district, where the collieries are situated. The Beynon Company, as sales agents, command greater control over the coal market than any other firm in the kingdom.

### Exports of Morphia

Sir R. HORNE, in reply to questions by Mr. Gilbert (House of Commons, May 18), has issued a statement showing the quantity and value of "morphia and morphia salts" (manufactured in the United Kingdom) exported from the United Kingdom to each country of destination during the year ended December 31, 1919 (exclusive of exports by post). The total shows 303,733 oz. exported to foreign countries, value £314,948, and 20,237 oz. to British possessions, value £21,913, making in all 322,970 oz., value £336,861.

# American Notes

**U.S. Oil Corporation**

A bill for the creation of a United States Oil Corporation for the purpose of developing all America's oil resources in foreign countries was introduced in the Senate on Monday, May 17, by Senator Phelan.

**Semet-Solvay Co.'s Earnings**

Financial statements of the Semet-Solvay Co. and the By-Products Coke Corporation, of Syracuse, N.Y., which have lately been issued show that neither company was able to pay the dividends declared from the net earnings during 1919 and that it was necessary to draw upon the surplus in order to pay the dividends. Strikes during 1919 caused losses of approximately $750,000 to the Semet-Solvay Co.

**Du Pont Company to Manufacture Artificial Silk**

The du Pont Company and the Comptoir des Textiles Artificiels, of Paris, have entered into an agreement whereby a new company will be formed in America for the manufacture of artificial silk. It is announced that the du Pont Fibersilk Co., with a capitalisation of $4,000,000 has been organised. The Comptoir des Textiles Artificiels controls practically all of the largest artificial silk plants in Europe. It is anticipated that the plant will be in full operation within a year.

**Domestic Sumac for Dyeing**

The U.S. Bureau of Chemistry is investigating the use of domestic sumac, which grows wild in the United States, as a vegetable dyeing and tanning material in place of Sicilian sumac which is now used largely by American dyers on account of its deeper colour. Experiments are being conducted to determine whether an extract of equally good colour can be obtained from the domestic sumac, which is much cheaper than the imported material.

**Cost of Dye Manufacture**

The Tariff Commission has made a report to the Senate Finance Committee on the cost of manufacturing dyes in the United States, embodying the results of a special investigation of the costs of thirty typical coal-tar products in 1918 and 1919. The report shows that the cost of producing these dyes is from two to five times greater than the German selling prices before the war, but that they are lower than the prices at which the reparation dyes were offered, counting the mark at par.

**Oil Contract for U.S. Navy**

Contracts have been awarded for 5,200,000 barrels of fuel oil for the United States Navy at prices averaging 150 per cent. above current contract prices. The orders have been placed as follows :—Cochrane Harper Co., 3,000,000 barrels at $3.24, New England delivery ; the Standard Oil Co. of New Jersey, 800,000 barrels at $3.25, New York delivery ; the Standard Oil Co. of Louisiana, 500,000 barrels at $2.85, Gulf delivery ; and the Texas Co., 900,000 barrels on the same basis. The fuel supplied is to consist of Mexican oil and light American distillates.

**Reorganising the Patent Office**

Representatives of the chemical and engineering societies and industries at a hearing before the House Committee on Rules, urged prompt consideration of the Nolan Bill for reorganisation of the Patent Office. They stated that the Patent Office is demoralised on account of the low salaries paid, and that inventors and scientists are seriously inconvenienced by long delay in action and by action without proper knowledge. Without the efficient co-operation of the Patent Office which would be insured by the Nolan Bill, the American dye and chemical industries will be helpless in the face of French and German competition, according to the representative of the Manufacturing Chemists' Association, inasmuch as delay in action on American patents will admit foreign chemicals without restriction for a six months' period, probably giving them a continuous market. The Nolan Bill has since passed the House and is awaiting action by the Senate.

**Japanese Estimate of American Chemical Industries**

An interesting but frankly critical impression of American chemical industries is given by Dr. Keizo Ikeguchi, as the result of his recent three months' tour of inspection. Although he went to the United States furnished with introductions from various large Japanese firms, the American drug and chemical manufacturers appear to have received him with some reserve, for he states that he was unable to obtain admission to any of their factories. He is inclined to attribute American pre-war indifference to the dye industry to the system of education adopted. "The object of higher education in America," he states, "is to turn out men who can do useful services to the country in as short a space of time as possible. Consequently no great encouragement is given to the conduct of painstaking scientific research such as is done in Germany. In America there are no such great scientists as to cause a revolution in the chemical world. America, it is true, has produced a great inventor in Mr. Edison, but it seems that Mr. Edison owes his success in science more to his experience than his aggressive research. The difference of temperament between the Americans and Germans is evident from their attitude toward science. Americans show great ability in handling concrete matters, but as regards the study of abstract science the palm must be given to the Germans. For this reason, America lacked before the war capable chemists who are required for the development of the coal-tar industry and the manufacture of dyes, drugs and chemicals, and was in much the same state of backwardness as Japan. With regard to the manufacture of heavy chemicals, however, America has not been inferior to Germany. The latter before the war used to regard America with jealousy and did everything to obstruct the development of the chemical industry in America."

**New Director of Bureau of Mines**

The resignation of Dr. Van H. Manning as director of the Bureau of Mines was not unexpected. It has been an open secret for several months that he would be selected as director of the research work of the American Petroleum Institute. Despite the very generally expressed preference for a mining engineer, the announcement that Dr. Frederick G. Cottrell, a chemist, had been recommended for the place brought forth no opposition. Dr. Cottrell's high professional standing and the fact that he has been in such close touch with the mining industry for so many years assure him of every confidence on the part of the mining industry. While at the university of California Dr. Cottrell's chief contributions to science were researches relating to the electrical precipitation of fume and fine particles suspended in the gases of smelter, blast-furnace or cement works flues, and he finally evolved what is known as the Cottrell process for this purpose. This invention was first utilised at the Selby smelter in California for removing fumes from the waste gases of a sulphuric acid plant at the smelter, thereby abating a nuisance that threatened to necessitate shutting down the works. Subsequently this electrical precipitation process was installed at other smelters to remove fume and solid particles contained in the escaping gases, and it was also successfully used at cement plants, notably near Riverside, Cal., to prevent the dust from the calcining kilns from damaging nearby orange groves and vegetation. To-day the Cottrell process of fume and dust removal is in world-wide use, and is recovering materials hitherto wasted to the value of many thousands of dollars.

In 1911 when Dr. J. A. Holmes, the first director of the Bureau of Mines, was serving as a member of commissions appointed by the Government to study alleged damages from smoke and fumes from the Selby and the Anaconda smelters, and when the Bureau of Mines was investigating at length the smelter-smoke problem, Dr. Cottrell, because of his scientific attainments and his special knowledge of metallurgical problems, was appointed chief physical chemist in the Bureau. In 1914 he was appointed chief chemist, in 1916 chief metallurgist, and in 1919 assistant director. Apart from his work on smelter smoke Dr. Cottrell has been deeply interested in and intimately connected with work on the separation and purification of gases by liquefication and fractional distillation. During the War and subsequently the development of the Norton or Bureau of Mines process for the recovery of helium from natural gas has been his special care, and it was chiefly through his efforts that a plant for recovering helium on a large scale for military aeronautics has been erected near Petroila, Tex. Dr. Cottrell is a member of the American Chemical Society, the Mining and Metallurgical Society of America, the American Electrochemical Society and the American Institute of Mining and Metallugical Engineers. He was awarded the Perkin Medal by the New York Section of the Society of Chemical Industry in 1919 in recognition of his work on electrical precipitation.

# From Week to Week

MR. E. A. COAD PRYOR, recently of the National Physical Laboratory, has been appointed director of laboratories for British Glass Industries, Ltd.

AT the Franco-German Economic Conference on Saturday, May 24, Sub-Commissions were appointed to deal with metals, textile industries, and chemical industry.

THE University of Oxford has conferred the degree of M.A. upon Alexander S. Russell, M.A., D.Sc. (Glasgow), and Dr. Lees Reader in Chemistry, Christ Church.

THE OLIVER CONTINUOUS FILTER CO., New York, we understand, are opening a London branch office early in July this year, and have appointed Mr. J. F. Mitchell Roberts as their representative.

The Australian House of Representatives last week passed the third reading of the Anglo-Persian OIL AGREEMENT after after having rejected the motion introduced by Dr. Tudor, Opposition leader.

IT is reported that petroleum in paying quantities has been discovered in Dutch Guiana. The Government of the Dutch colony is issuing licences to parties to explore lands that are said to contain oil.

A LARGE Canadian chemical company now being organised will take over and operate the $5,000,000 plant of the Imperial Munitions Board at Trenton, Ontario. Toronto and Montreal capitalists are interested.

THE SENATE of St. Andrew's University have agreed to confer the honorary degree of LL.D. on Sir Dugald Clerk, and on Mr. W. J. Matheson, New York, one of the leaders in applied chemistry in the United States.

WITH her cargo of oilcake on fire, the large steamer Mount Berryon, which was on a voyage from Hull to America, was put aground at Dover on Sunday, with the aid of tugs, and pumping operations were begun.

ON account of the greater facilities now provided in schools for the teaching of chemistry, physics and biology, Cambridge University proposes to make it possible for students to take the first M.B. examination before going into residence.

The names of the undermentioned companies have been struck off the register of JOINT STOCK COMPANIES and are thereby dissolved :—African Meta's Syndicate, Ltd., Calgary Oil Development Syndicate, Ltd., and U.K.Chemical Products,Ltd.

THE FISHER CHEMICAL ENGINEERING CO., LTD., 21, Panton Street, London, S.W.1, announce that in future the company will be known as the Standard Chemical Engineering Co., Ltd., and their extraction plants will be described as the Standard oil extraction plants. The alteration is in respect of the name only, and the business will be conducted as hitherto, under the same management, engineers and technical staff.

Quoting approximately £20,000 less than the price asked by manufacturers in South Wales, American rivals have secured contracts for the erection of six tin-plate mills for the TATA IRON & STEEL COMPANY, India. The building of similar large plants abroad is projected, and, at current prices, it is feared that Wales will have difficulty in retaining her position in the market.

Mr. E. G. PHILLIPS, M.I.E.E., A.M.I.Mech.E., chief-engineer for the past 12 years with Boots Pure Drug Co., Ltd., has decided to undertake private practice. On Friday, May 21, Mr. T. S. Radcliffe, general manager of the firm, in the presence of over 100 employees engaged under the supervision of Mr. Phillips, presented him with a secretarial desk on his departure and expressed their esteem and goodwill.

Chemical output in South Staffordshire was seriously retarded last week in consequence of a strike of canal bargemen. Many of the iron and steel works that get the bulk of their supplies by water were closed, and on Wednesday, a portion of Messrs. Chance & Hunt's chemical works stopped operations, and on Friday, Albright & Wilson closed down their Oldbury Works. With a settlement of the strike a normal position will soon be cleared.

IT was announced on Tuesday by the secretary of the Drug and Fine Chemical Manufacturers' Association that work has been resumed at the works of Burroughs, Wellcome & Co., London and Dartford, and Evans, Sons, Lescher & Webb, Ltd., London and Liverpool. In each case the workers have returned unconditionally. A later report states that the officials of the Warehousemen and General Workers' Union say that the men have gone back not unconditionally, but on the understanding that there will be a further hearing of the men's case by the Industrial Court in June, the award of the Court to date back to April.

It is reported that Dr. J. O. ARNOLD, formerly Professor of Metallurgy in the University of Sheffield, has sold his production rights in the new high-speed steel invented by him to Mr. J. D. Moffat, one of the directors of Sir Thomas Salter Pyne & Co., and that the new steel is to be made in Sheffield. Mr. Moffat, having obtained the right of producing the new steel, has, we understand, arranged to acquire the controlling interest in a Sheffield firm, and is making arrangements for placing molybdenum steel on the market. It is stated that there is a prospect of cheapening its production by a new method which is to be employed at the Sheffield works, so that its cost may not exceed one-half that of tungsten.

AT the Board of Trade, on Friday, May 21, Mr. W. C. Bridgeman, M.P., Parliamentary Secretary, received a deputation representing the Motor Legislation Committee, the Royal Automobile Club, and the Commercial Motor Users' Association, on the subject of BENZOL PRODUCTION AT GASWORKS. It was urged by the deputation that an amendment should be introduced into the Gas Regulation Bill, now before Parliament, with the object of imposing upon gas undertakings the obligation of "scrubbing," with a view to the extraction of the largest possible quantities of benzol. Sir W. Joynson-Hicks, M.P., who introduced the deputation, urged that the war-time obligation of gas undertakings to increase their output of benzol should be continued in the national interests. Mr. Bridgeman promised that the subject should receive careful consideration.

THE Federal Minister of Trade, Mr. Massy Greene, in introducing the new tariff in the Tasmanian House of Representatives, made the following important reference to the ELECTROLYTIC ZINC COMPANY'S works at Risdon, near Hobart :—"The manufacture of spelter is now being carried on at Hobart in connection with the hydro-electric power scheme installed by the Tasmanian Government. This is a key industry of great importance, and capable of large development. In addition to spelter, zinc sheets are being rolled, and it is proposed to extend the manufacture to the following :—Lithopone blocks for marine boilers ; zinc shavings for the gold industry ; zinc dust for sheradizing metallic aluminium ; ferro alloys ; zinc alloys ; zinc chloride ; zinc sulphate ; caustic soda ; bleaching powder ; other chlorine products ; and carbide of calcium." The outlay on these works is estimated to approximate to £1,500,000, and the plant, which is now producing 70 tons of spelter per week, is being extended to produce 100 tons a day. In 1918 these works produced from New South Wales over 3,822 tons of spelter valued at £152,880, and in 1919 3,668 tons, valued at £160,660. In addition 285 tons were produced experimentally from Tasmanian ores.

## French Output of Heavy Chemicals

Progress in the manufacture of heavy chemicals in France is shown in the following cable comparing the pre-war production with the output in 1919 :—

| Products. | 1913 | | 1919 | |
|---|---|---|---|---|
| | Production. | Consumption. | Production. | Consumption. |
| Sulphuric acid, 58° | 1,160,000 | 1,172,500 | 2,500,000 | 1,500,000 |
| Sulphuric acid, 66° | 58,000 | 58,000 | 1,200,000 | — |
| Oleum (fuming sulphuric acid) | 6,000 | 6,000 | 300,000 | 25,000 |
| Nitric acid | 20,000 | 18,500 | 300,000 | 20,000 |
| Sodium salts | 625,500 | 596,000 | 800,000 | 650,000 |
| Liquid chlorine | 300 | — | 90,000 | 15,000 |
| Bromine | — | 100 | 500 | 200 |
| Calcium carbide | 32,000 | 28,000 | 200,000 | — |
| Calcium cyanamide | 7,500 | 8,000 | 300,000 | — |
| Ammonium salts | 75,000 | 95,000 | 200,000 | 150,000 |
| Nitrate of lime | — | 9,500 | 250,000 | 250,000 |
| Natural phosphates | 2,700,000 | 1,220,000 | 3,000,000 | 2,700,000 |
| Superphosphates | 1,965,000 | 1,900,000 | 2,500,000 | 2,500,000 |
| Phosphorus | 300 | 30 | 3,000 | — |

# References to Current Literature

*Only articles of general as distinct from specialised interest are included and given in alphabetical order under each geographical subdivision. By publishing this digest within two or three days of publication or receipt we hope to save our readers time and trouble; in return we invite their suggestions and criticisms. The original journals may be consulted at the Patent Office or Chemical Society's libraries. A list of journals and standard abbreviations used appeared in our issue of December 27 last.*

### British

CATALYSIS. A study of catalytic action at solid surfaces. III., The hydrogenation of acetaldehyde and the dehydrogenation of ethyl alcohol in presence of finely divided metals. E. F. Armstrong and T. P. Hilditch. *Proc. Roy. Soc.*, A, May 1, 259-264. IV., The interaction of carbon monoxide and steam as conditioned by iron oxide and by copper. E. F. Armstrong and T. P. Hilditch, *ibid.* 265-273.

### Colonial

CHROMITE. Concentration of chromite. L. K. Fletcher. *Trans. Canad. Min. Inst.*, 1919, 123-129.

FUEL. Application of pulverised coal in blast furnaces. E. P. Mathewson and W. L. Wotherspoon. *Trans. Canad. Min. Inst.*, 1919, 33-60.

Liquid fuels, their uses, production, consumption and sources in Canada. B. F. Haanel. *Trans. Canad. Min. Inst.*, 1919, 215-239.

Rational use of coal for power and heat. J. Blizard. *Trans. Canad. Min. Inst.*, 1919, 240-249.

MOLYBDENUM. Notes on molybdenum and the production of ferromolybdenum at Orilla, Ont. B. C. Lamble. *Trans. Canad. Min. Inst.*, 1919, 61-67.

Recent improvements in the concentration of molybdenum. H. H. Claudet. *Trans. Canad. Min. Inst.*, 1919, 68-75.

### French

ACETIC ACID. Catalytic preparation of acetic acid by the dry process. A. Mailhe and F. de Godon. *Bull. Soc. Chim.*, May 5, 330-335.

ADHESIVES. The composition of the various glues used in industries. *Caoutchouc et Gutta-Percha*, May 15, 10347-10353. A number of useful recipes for adhesives are given.

ANALYSIS. Determination of arsenic acid by the iodometric method. P. Fleury. *J. Pharm. Chim.*, May 16, 385-391.

BENZENE. Impurities in benzene extracted from industrial chlorobenzenes. F. Bourion. *Comptes rend.*, May 17, 1181-1184.

ETHERS. Catalytic preparation of certain ether oxides by the dry process. A. Mailhe and F. de Godon. *Bull. Soc. Chim.*, May 5, 328-330.

### United States

ACETIC ACID. Synthetic acetic acid and acetone. J. T. Rooney. *Chem. & Met. Eng.*, May 5, 847-850. An account of the operations of Canadian Electro Products.

ANALYSIS. Electrolytic determination of tin as tin tetrachloride. G. P. Baxter and H. W. Starkweather. *J. Amer. Chem. Soc.*, May, 905-917.

The identification of acids. V., Para halogen phenacylisters. W. L. Judefind and E. E. Reid. *J. Amer. Chem. Soc.*, May, 1043-1055. The *p*-halogen phenacyl ethers of a number of acids have been prepared.

FORMALDEHYDE. The preparation of formaldehyde. M. D. Thomas. *J. Amer. Chem. Soc.*, May, 867-882. The best conditions for oxidising methyl alcohol have been investigated.

NITROGEN. The supply of inorganic nitrogen in the United States. D. P. Gaillard. *Chem. & Met. Eng.*, May 5, 841-845. The various sources of supply are discussed. (See also CHEMICAL AGE, 1920, 561.)

OILS. Operation of the Gainesville castor oil plant. J. H. Shrader and A. C. Goetz. *Chem. & Met. Eng.*, May 5, 833-838. An interesting description of the process used.

Fume losses in boiling oils. H. A. Gardner and H. Parks. *Circ.* 95, *Paint Manufrs. Assoc., U.S.*, 3 pp. The losses occurring during the boiling of six different oils have been determined.

Salmon fish oil. H. A. Gardner. *Circ.* 95, *Paint Manufrs. Assoc., U.S.*, 2 pp. The possibilities of using salmon oil for paints are discussed.

SILICATES. The commercial synthesis of sillimanite. A. Malinovszky. *Chem. & Met. Eng.*, May 5, 851-853.

WATER. The hot-process water softener. G. H. Gibson. *Chem. & Met. Eng.*, May 12, 899-902. Apparatus for applying the "hot process" of water softening is illustrated.

### German

AMMONIUM SULPHATE. The melting point of neutral ammonium sulphate. K. Caspar. *Ber.*, May 15, 821.

ANALYSIS. Estimation of quinine. C. Bamberger. *Pharm. Zentralh.*, May 6 and 13, 257-259, 267-270.

Detection of water in alcohol and other organic solvents. F. Henle. *Ber.*, May 15, 719-722.

Graphic representation of analyses of furnace gases. H. Meryer. *Stahl u. Eisen*, May 6, 605-610.

APPARATUS. Standardisation of laboratory apparatus. *Z. angier. Chem.*, May 4, 105-106. A further discussion of iron stands. (*See* THE CHEMICAL AGE, 1920, 534.)

CYANAMIDE. The physiological action of cyanamide. Siebner. *Chem.-Zeit.*, May 18 and 22, 369-370, 382-383.

ETCHING. Rosenhain's etching reagent as modified by Oberhoffer. A. Fry. *Stahl u. Eisen*, May 6, 622-623.

FUEL. Solid fuels in 1919. W. Bertelsmann. *Chem. Zeit.*, May 13, 363-365. The literature on wood and peat is reviewed.

FUEL. Solid fuels in 1919. W. Bertelsmann. *Chem.-Zeit.*, May 18, 370-371. The literature on the analysis of coal and on firing is reviewed.

LIME. Slaked lime and milk of lime. B. Kosmann. *Z. Elektrochem.*, May 1, 173-181. Studies on the hydration of lime are described.

Notes on recovered metals. A. Würth. *Stahl u. Eisen*, April 29, 568-575. The utilisation of waste and recovered metals is discussed.

NITROGEN FIXATION. The electrolytic potential of the process: Nitrite→nitrate+nitric oxide. Energy relations of the principal compounds of nitrogen with oxygen and hydrogen. H. Pick. *Z. Elektrochem.*, May 1, 182-196. Many valuable data on nitrogen fixation are given.

RARE EARTHS. Separation of the rare earths by basic precipitation. W. Prandtl and J. Rauchenberger. *Ber.*, May 15, 843-853.

VARNISHES. Review of the progress of raw materials, adjuncts and substitutes used in the manufacture of varnishes and lacquers, and of progress in making varnishes, &c., in 1919. Utz. *Farben-Zeit.*, May 1, 1361-1362. Conclusion of article. (*See* THE CHEMICAL AGE, 1920, 411, 508, 535.) This instalment deals with lacquer.

VOLATILE SUBSTANCES. The experimental treatment of volatile substances. IV., A. Stock. *Ber.*, May 15, 751-758. The estimation of vapour pressure, fractional distillation, &c., are discussed.

### Miscellaneous

ALLOYS. Micro-metallurgical researches. M. H. Bogdan. *Bul. Soc. Chim.* Romania, Vol. I., Nos. 3-4, 60-72. Researches on copper-silicon and iron-silicon alloys are described.

ANALYSIS. The third and fourth dissociation constants of pyrophosphoric acid. The estimation of sodium pyrophosphate. J. M. Kolthoff. *Pharm. Weekblad*, May 1, 474-481.

Use of dissociation constants in the identification of acids in presence of impurities. J. M. Kolthoff. *Pharm. Weekblad*, May 8, 514-518.

The various methods for determining manganese, and their use in the examination of plant ashes and similar products. D. H. Wester. *Rec. Tras. Chim.*, May 15, 414-422.

# Patent Literature

*We publish each week a list of selected complete specifications accepted as and when they are actually printed and on sale. In addition, we give abstracts within a week of the specifications being obtainable. Readers can thus decide what specifications are of sufficient interest to warrant purchase, the only way of obtaining complete information. A list of International Convention specifications open to inspection before acceptance is added, and abstracts are given as soon as possible.*

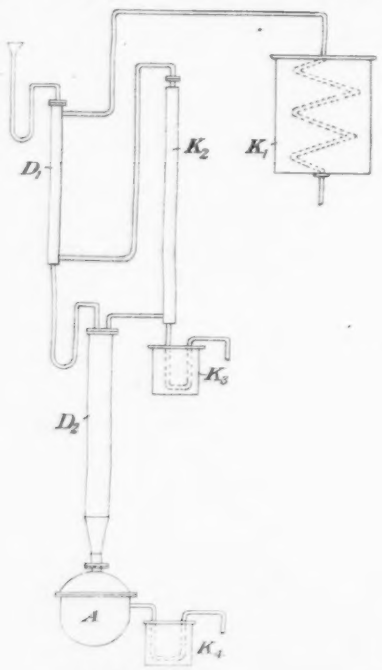
## Abstracts of Complete Specifications

119,647. ALKALI CHROMATES, PROCESS FOR ISOLATING OR PURIFYING. Soc. Industrielle de Produits Chimiques, 10, Rue de Vienne, Paris. International Convention date (France), August 2, 1917.

Crude alkali chromates are treated with an organic solvent such as ethyl or methyl alcohol or acetone with or without chalk, to dissolve the alkali hydrates present. The process may also be carried out in solution, when the liquid separates into two layers, the lighter alcoholic solution of alkalies above and the heavier aqueous solution of chromates below. The chromate may be treated with steam either before or after treating with the organic solvent to destroy any alkali ferrite present. The residue consists of chromates, carbonates, aluminates and silicates, and is treated with carbon dioxide in the presence or absence of water to remove any alkali hydrates remaining and also the carbonates, aluminates and silicates. These impurities are converted into insoluble products, but the chromates remain unchanged.

124,191. PURE CONCENTRATED NITRIC ACID AND TETROXIDE OF NITROGEN, PRODUCTION OF. Norsk Hydro-Elektrisk Kvaelstofaktieselskab, Solligaten 7, Christiania. International Convention date (Norway), March 13, 1918.

The object is to produce pure concentrated nitric acid from nitric acid containing nitrogen oxides. The acid to be treated is introduced at the top of the column $D_1$ into the bottom of which vapour of highly concentrated acid from the condenser

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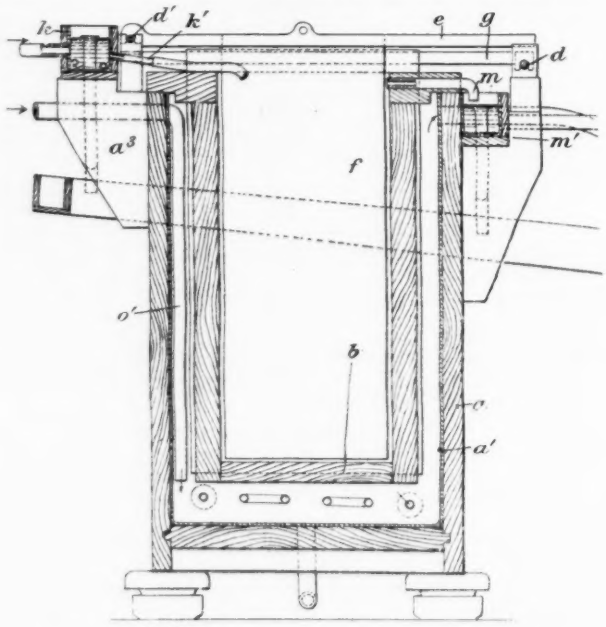
$K_2$ is introduced. The acid is thereby freed from nitrogen peroxide, and passes to the top of the dephlegmating column $D_2$, and from the bottom of this to the boiler A. The vapour of concentrated nitric acid passes from the top of the column $D_2$ to the condenser $K_2$ where it is partly condensed, and the uncondensed vapour passes to the bottom of the column $D_1$. Pure nitrogen peroxide passes from the top of the column $D_1$ to the water-cooled condenser $K_1$ where it is condensed. The pure and highly concentrated acid passes out through the cooler $K_2$ and a more dilute acid of 70 per cent. strength passes out through the cooler $K_4$.

141,766. ELECTROLYSING A SOLUTION OF A NICKEL SALT, METHOD OF AND APPARATUS FOR. C. Heberlein, 15, Western Gardens, Ealing, London. Application date, October 29, 1918.

In processes for extracting nickel which involve the electrolytic deposition of nickel from its salts with the use of insoluble anodes, a difficulty is usually experienced in that it is not possible to continue the deposition after a comparatively short time, owing to the production of free acid. When the acid reaches 2 per cent. the current efficiency is reduced to 21 per cent. with a current density of 10 amperes per square foot. Further, the necessity for keeping down the acidity of the electrolyte involves a concentration of the latter when the liquor is subsequently used for preparing a nickel salt. The object is to avoid these difficulties. The nickel is dissolved from ore, matte or the like by means of acid until a solution having an acidity of not more than 2 per cent. is obtained, and

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the liquor is then circulated through the cathode compartments of a number of electrolytic vats in series. A nickel salt solution is also circulated through the anode compartments in series, the circulation being continuous, until the acidity of the anode solution reaches 15 per cent. when it may be withdrawn wholly or in part and used for treating fresh ore, matte or the like. The liquor from the cathode compartments is mixed with the fresh nickel salt solution to obtain a solution of not more than 2 per cent. acidity. The vat *a* having a lead lining *a'* supports a number of wooden frames *b*, which form the ends and bottom of the cathode compartments, the sides of which are composed of sheets of asbestos. A pair of conducting bars *e* extend over each cathode compartment, and are connected electrically with the bar *d'* which is supported on a bracket $a_3$. An iron cathode *f* is supported by each pair of bars. The cathode compartments are spaced apart in the vat, which thus forms a single anode compartment, and lead anodes are suspended between the cathode compartments

from the conducting bars *g* connected to the bar *d*. The cathode liquor flows into the lead-lined trough *k* and thence through pipes *k'* into each cathode compartment. The heavier fresh liquid displaces the lighter spent liquor through the pipe *m* into the trough *m'*, from which it passes into the trough of the next vat. The anode liquor flows into the bottom of the vat *a* by a pipe *o'*, displacing the spent liquor through a pipe at the opposite side which conveys it to the bottom of the next vat. The anode liquor is then used for treating a fresh quantity of matte.

141,787. SULPHATE OF AMMONIA, MANUFACTURE OF. S. E. Linder, Leodholt, The Drive, Buckhurst Hill, Essex, and R. Lessing, Southampton House, 317, High Holborn, London, W.C.2. Application date, January 18, 1919.

The object is to neutralise the small proportion of acid contained in commercial sulphate of ammonia and to produce a product which is not liable to cake. This is effected by neutralising the free sulphuric acid and simultaneously agitating and drying the product under the action of heat. The neutralising agents may be solid, liquid, or gaseous, *e.g.*, lime, magnesia, or other alkaline earths or their carbonates, fixed alkalies or their carbonates, or ammonium salts, such as the carbonate, sulphide, or sulphite, or ammonia itself either as a crude or concentrated ammoniacal liquor or as a pure solution. Ammonia or its salts may also be used in the gaseous form, and the gas obtained in the carbonisation of coal, shale, peat, or the like, may also be used when freed from tar. The treatment may be carried out in the drum of a ball mill which is heated by gas burners. About 0·4 per cent. of dry powdered hydrated lime or an equivalent quantity of ammonia liquor is added to sulphate of ammonia which may contain 2 per cent. of water and 0·4 per cent. of sulphuric acid, and the drum is rotated. Air is blown through the drum and carries away moisture, excess of ammonia and pyridine which are absorbed in a scrubber containing an acid solution of sulphate of ammonia, such as the mother liquor from the saturator. About 20 to 30 minutes' drying is sufficient, and the sulphate of ammonia free from acid and pyridine is discharged as a granular product. The process may be made continuous by using a plant of the tube mill type. The product has an ammonia content equal to that of the chemically pure salt.

141,798. AMMONIUM SULPHATE, MANUFACTURE OF. South Metropolitan Gas Co., E. V. Evans and H. Hollings, 709, Old Kent Road, London. Application date, January 20, 1919.

The object is to produce ammonium sulphate in a dry and non-caking form. The ammonium sulphate crystals, which are acid when separated from the liquor, are neutralised in any known manner and are then dried by passing them downwards through a tower through which air at 80° -100°C. is passed upwards. The salt is then crushed to the desired degree of fineness.

141,799. SULPHATE OF AMMONIA, MANUFACTURE OF. South Metropolitan Gas Co., 709, Old Kent Road, London, and O. W. Weight, 46, Haywood Road, Bromley, Kent. Application date, January 20, 1919.

The object is to neutralise the free acid in ordinary ammonium sulphate, and to avoid the loss of ammonia which occurs when that substance is used as the reagent. The neutralising agent used is ammonium sulphite or bisulphite, which may be added in the solid form to the ammonium sulphate as it is passing through the crusher, or it may be used as a solution which is sprinkled on the sulphate when the latter is subjected to a final drying operation. Alternatively, ammonium sulphite or bisulphite may be added to the washing liquor.

141,819. NEUTRAL SULPHATE OF AMMONIA, MANUFACTURE OF. South Metropolitan Gas Co., 709, Old Kent Road, London, S.E.15; P. Parrish, 64, Foyle Road, Blackheath, London, S.E.; and W. A. M. Valon, Corporation Gas Works, Stafford. Application date, January 23, 1919.

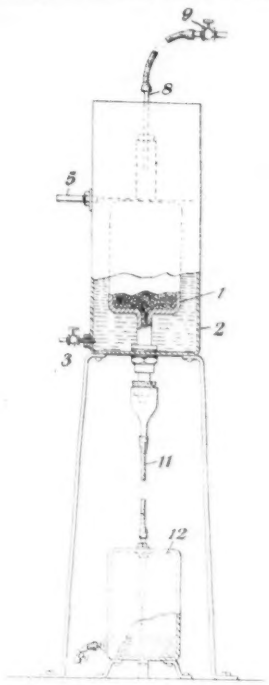
The acid which remains in sulphate of ammonia is neutralised with ammonia free from sulphuretted hydrogen, which is obtained from a fixed ammonia still. When the ammonia solution thus obtained is used at a raised temperature in order to avoid further crystallisation in the centrifuge containing the ammonium sulphate crystals, the vapour pressure of the ammonia at that temperature results in a considerable loss of ammonia. In this invention the vapour from the fixed ammonia still is condensed and the solution is diluted to such a strength that it may be heated to the required temperature without any substantial loss of ammonia. A suitable diluent for the condensed vapour is obtained by subjecting the hot waste liquor from the still to a slightly reduced pressure, when steam containing part of the residual ammonia can be withdrawn and condensed to a weak ammoniacal liquid. This liquid is suitable for diluting the ammonia solution.

141,828. GAS FROM COAL OR LIKE CARBONACEOUS MATERIAL, METHOD OF MANUFACTURING. C. E. Holt, Oaklea, Hill Top, Manchester Road, Wilmslow, near Manchester; and T. Walker, Oak Bank, Albert Road, Wilmslow, near Manchester. Application date, February 4, 1919.

Pulverised coal is contained in a fixed, jacketed, and heated hopper, in which it is dried previous to its introduction into the retort. Steam at a comparatively low pressure is injected into the retort so as to mix with the falling coal dust. The steam maintains the coal in a divided condition and prevents the formation of tar.

141,908. FLUID HALOGEN COMPOUNDS OF SILICON, BORON OR TITANIUM, PRODUCTION OF. The British Thomson-Houston Co., Ltd., 83, Cannon Street, London, E.C.4. (From The General Electric Co., Schenectady, N.Y., U.S.A.). Application date, April 23, 1919.

The object is to control the exothermic chemical reactions which take place in the production of liquid halogen compounds of silicon, boron, or titanium and thus to avoid the production of solid halogen compounds by secondary reactions. A comminuted charge of silicon, silicon carbide, or the like is

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placed in a copper container 1 which is cooled by water circulating through the surrounding tank 2 from the pipe 3 to the pipe 5. The halogen is introduced through a tube 8, provided with a regulating valve 9. The reaction is started by introducing a little of the silicon, or silicon carbide which has been previously heated, and then starting the stream of halogen. Liquid silicon tetrachloride or other corresponding product is continuously produced and flows through the tube 11 to the tank 12. This tank is preferably of glass so that the production of a solid product may be observed and may be avoided by increasing the circulation of cooling water or lowering its temperature. It is found that the reaction may

be effectively controlled solely by abstracting heat from the reaction zone in this manner, without controlling the supply of halogen and thus diminishing the rate of production of the desired product.

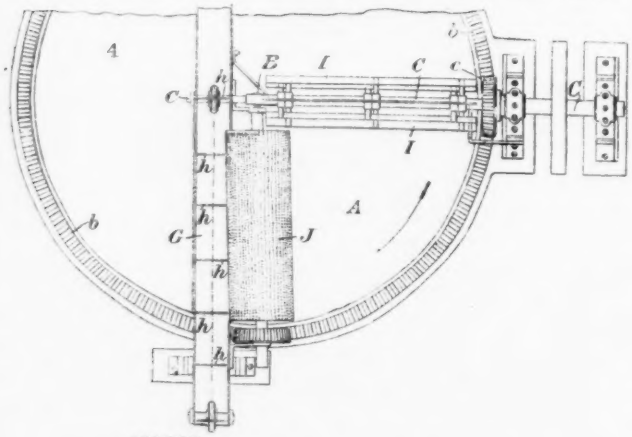
141,864. FRACTIONATING AIR, METHODS OF, AND APPARATUS FOR. The British Thomson-Houston Co., Ltd., 83, Cannon Street, London, E.C.4 (From The General Electric Co., Schenectady, N.Y., U.S.A.) Application date, March 14, 1919.

The object is to obtain oxygen, nitrogen and argon from liquid air. The compressed air, previously cooled by passing through a cooling coil immersed in liquid air at the bottom of a rectification column, is passed through an expansion valve, to the top of the rectification column. Liquid air is thus finally produced and in descending through the perforated baffle plates in the rectifier meets the vapour acsending from the liquid at the foot of the column. This fractionation is continued until the greater part of the argon passes off with the nitrogen, and the mixture is conveyed through a pipe at the top of the rectifier to a compressor and thence to a cooling coil immersed in the liquefied gas at the bottom of a second rectification column. The cooled gas then passes through a second expansion valve to the top of the column so that a second rectification takes place. The gas passing off at the top of this column consists of substantially pure nitrogen which may be used for fixation processes. The liquid collecting at the foot of the column consists of argon and oxygen with only about 2 per cent. of nitrogen, and the argon may be isolated by removing the oxygen by chemical means. The liquid collecting in the first rectification column consists of oxygen mixed with about 1 per cent. or less of other gas.

141,925. BARIUM CARBONATE, MANUFACTURE OF FINELY SUBDIVIDED. H. Langwell, Parkfield Works, Stockton-on-Tees, Durham. Application date, May 10, 1919.

Barium carbonate, in the form of witherite or the artificial carbonate, is dissolved in fused sodium chloride. The mixture is exposed to an oxidising atmosphere to oxidise the solid impurities, which are then removed. The molten mixture is tllen tested by withdrawing a small portion into water when finely divided barium carbonate separates out. If the separated barium carbonate is of a greyish colour it is analysed to determine whether the colour is due to under-oxidation or over-oxidation. If the former a small proportion of sodium nitrate is added, and if the latter, the furnace is closed down and a reducing atmosphere maintained. When a sample tested in this way gives a white deposit of barium carbonate, the whole charge is run into cold water to dissolve out the salt and leave the barium carbonate in a finely divided condition.

141,942. DETACHED OR FLAKE CAUSTIC SODA OR OTHER MATTER REQUIRED TO BE OBTAINED IN A STATE OF DIVISION, APPARATUS FOR THE MANUFACTURE OF—FROM A FUSED OR MOLTEN MASS. T. Minton and The United Alkali Co., Ltd., Cunard Building, Liverpool. Application date, May 23, 1919.




Molten caustic soda is received in a horizontal circular pan A (shown in plan) carried by a central post B and rotated by the pinion *c* engaging with a toothed ring *b* on the pan A. The underside of the pan is provided with webs which dip into cold water. A horizontal trough G is arranged above the pan and an endless chain carrying scrapers *h* operates in it. A rotary beater I carried by the shaft C breaks up the caustic soda, and a steel wire brush J rotated from the toothed ring *b* sweeps it over an inclined plate into the trough G from which it is continuously conveyed away by the scrapers *h* to the discharge.

NOTE.—The following specifications which are now accepted were abstracted when they became open to inspection under the International Convention: 128,215 (Dreyfus), relating to cellulose acetate, &c.; 130,619 (Duclaux), relating to nitrocellulose; and 135,844 (Dorr Co.), relating to treatment of fine ores. (*See* THE CHEMICAL AGE, Vol. I. page 257; Vol. I., page 478; and Vol. II., page 159, respectively.)

## International Specifications Not yet Accepted

LATEST NOTIFICATIONS

143,185 and 143,187. Resin-like Substances, Process for the Manufacture of. M. Melamid. May 12 and May 13, 1919.

143,193. Transformer Oil from Tar Oils, Manufacture of. M. Melamid. May 15, 1919.

143,196. Extraction of Fatty Matter from Garbage and other Fat Containing Materials. L. C. Whiton and V. Bredlik. May 15, 1919.

143,212. Glucose from Wood, Process and Apparatus for obtaining. H. Terrisse and M. Levy. May 13, 1919.

143,217. Distillation, Apparatus for. V. L. Emerson. May 8, 1919.

143,223. Destructive Distillation of Schists, Shales, Peat, &c., under Vacuum or in Presence of Steam. G. P. Guignard and G. L. Felizat. April 12, 1919.

143,242. Dyeing with Acid-sulpho-amino Dyestuffs. Farbenfabriken vorm. F. Bayer & Co. October 31, 1914.

143,260. Dialkylsulphates, Process of manufacture of. L. Lilienfeld. December 15, 1913.

## Specifications Accepted, with Date of Application

123,099. Coke ovens. E. Hurez. January 26, 1918.

128,944. Separating solids from liquids, Process of and apparatus for. J. Y. Conte. June 27, 1918.

134,207. Effecting crystallisation from solution. Norsk Hydro-Elektrisk Kvaelstofaktieselskab. October 23, 1918.

138,111. Alkali chromates, Process for isolating or purifying. Soc. Industrielle de Produits Chimiques. August 2, 1917.

142,150. Synthesis of ammonia at very high pressures, Apparatus for. Soc. l'Air Liquide (Soc. Anon. pour l'Exploitation des procedes G. Claude). February 20, 1918.

142,157. Oxidation of tin, and the production of tin-oxide, Methods and apparatus for the improvements being also applicable for the treatment of zinc and zinc-containing materials for the production of zinc oxide. H. Maconochie and D. de Ros. October 30, 1918.

142,163. Coal, carbonaceous material, oil shales and the like, Method of and apparatus for the distillation, carbonisation, or gasification of. J. E. Christopher. December 30, 1918.

142,176. Mixing, grinding, drying and chemically treating material. F. R. Ablett. January 27, 1919.

142,203. Washing gas, Apparatus for. T. H. Hack and H. F. Boughton. February 5, 1919.

142,206. Hydrocarbons and other substances in the liquid and/or vapour phases, Process relating to the decomposition of. W. Mann. February 6, 1919.

142,226. Cymene, Process of treating. Selden Co. and J. M. Selden. February 20, 1919.

142,246. and 142,389. Grading or concentration of ores and the like. F. G. Gasche. March 14, 1919.

142,310. Nickel from cupro-nickel alloys, scrap and the like, Method or process for separating or recovering. A. McKechnie and McKechnie Bros. May 10, 1919.

142,354. Cyanamide, Manufacture of—and apparatus therefor. A. Duchemin. June 30, 1919.

142,376. Distilling boiler, more especially for the distillation of heavy hydrocarbons of the petroleum, lignite-tar, and coal tar industry and the like. L. Steinschneider. August 14, 1919.

## Applications for Patents

Allis Chalmers Manufacturing Co. Controlling flow of ore in roasting furnace. 13,786. May 19.
Bilsland, J. Mixing mills. 14,115 and 14,118. May 21.
Brunner, E. Hydrazobenzene, &c., in solid form. 13,592. May 17. (Switzerland, July 12, 1919.)
Dorr Co. Washing and classifying ores, &c. 13,536. May 17.
Doverdale (E. Partington), Baron. Filtering and clarifying liquids. 14,030. May 21.
Duckham, Sir A. M. Fractional distillation. 14,104. May 21.
Dunham, H. V. Casein solution. 13,561. May 17.
Du Pont de Nemours & Co., E. I. Propellent powder. 13,811. May 19. (U.S.A., August 23, 1919.)
Graham, E. A. Crushing ore, rock, cement, &c. 13,946. May 20.
Hutton, H. W. Acid refining of mineral oils. 13,887 and 13,888. May 20.
Langer, C. Electrolytic separation of metals. 13,775. May 19.
Lewis, G. P. Purification of gases. 13,554. May 17.
Lilienfeld, L. Alkyl derivatives of carbohydrates, &c. 13,568. May 17. (Austria, August 6, 1919.)
Lilienfeld, L. Production of oily bodies of high boiling point. 14,094. May 21. (Austria, May 10.)
Macbeth, C. Mixing mills. 14,115 and 14,118. May 21.
McKee, R. H. Making hydrogen and zinc oxide. 13,579. May 17.
Mining & Metallurgical Processes, Ltd. Blast roasting apparatus, &c. 13,958. May 20. (Australia, July 9, 1919.)
Moffat, J. W. Treating metallic ores. 13,570. May 17. (U.S.A., April 30, 1918.)
Morgan, G. T. Colour-producing intermediates. 13,954. May 20.
Morgan, J. S. Recovering gases absorbed by solids. 14,102. May 21.
Morgan, J. S. Treating acid used for purifying oils. 14,103. May 21.
Neilson, F. J. Acid refining of mineral oils. 13,887 and 13,888. May 20.
Nitrogen Corporation. Production of ammonia. 13,810. May 19. (U.S.A., March 23, 1916.)
Norsk Hydro-Elektrisk Kraelstofaktieselskab. Producing ammonia and formic acid or ammonium formate from barium cyanide. 13,702. May 18. (Norway, May 26, 1919.)
Norsk Hydro-Elektrisk Kraelstofaktieselskab. Producing mixtures of nitrogen and hydrogen. 14,069. May 21. (Norway, May 23, 1919.)
Quain, J. R. Purifying gases. 13,554. May 17.
Rambush, N. E. Removing sulphur from gases. 14,106. May 21.
Salomonson, H. W. Neutralising oils or fats. 13,970. May 20.
Sawtelle, E. M. Destructive distillation of wood. 13,718. May 18. (U.S.A., September 10, 1916.)
Schweizerische Sodafabrik. Producing caustic soda or lye. 13,548. May 17. (Switzerland, June 4, 1919.)
Soc. Chimique des Usines du Rhone (Gilliard, P. Monnet, et Cartier). Dyeing cellulose acetate, artificial silk, &c. 13,541. May 17. (France, September 5, 1919.)
Thermal, Industrial & Chemical Research Co. Recovering gases absorbed by solids. 14,102. May 21.
Thermal, Industrial & Chemical Research Co. Treating acid used for purifying oils. 14,103. May 21.

# Nationalisation in Germany

### The State's Electro-Chemical Industries

**(From a Correspondent)**

AN important and interesting official announcement has just appeared in Germany, issued by the Industries Branch (Industrie-Abteilung or Abteilung I.) of the Finance Ministry, dealing with the State's activities in various industries, more particularly the electro-chemical industries.

Action was first taken in this direction in the autumn of 1917, when the Government acquired from the A.E.G. (Allgemeinen Elektrizitäts-Ges.) the whole of the shares in the Elektrowerke Akt.-Ges. The latter company owns the large power station at Zschornewitz, near Bitterfeld, where the lignite deposits of Golpa are used as fuel, and a total power capacity of about 100,000 kw. is attained. This power is largely used for the state nitrogen works at Wittenberg, but some is transmitted to Berlin to supplement the inadequate coal supply. During 1920 it is hoped to supply power also to Leipsic and other places in Saxony. To look after these various schemes of power transmission in the most efficient and economical manner a special company was formed, called the Gesellschaft für Kraftübertragung m.b.H., and entirely financed by the State.

In 1919 the Government acquired an interest in the lignite deposits of Lower Lusatia, in the neighbourhood of which—at Senftenberg—the Aluminiumwerk Lauta had been erected during the war, together with a large power station of about 60,000 kw. capacity. This power station was taken over by another national company, the Mitteldeutsche Kraftwerke Akt.-Ges., which also absorbed the Niederlausitzer Kraftwerke Akt.-Ges. (Lower Lusatian Power Co.), together with the lignity properties at Brigitta, near Spremberg, and 20,000 kw. power station.

The power stations at Lauta and Spremberg have hitherto been used for the manufacture of aluminium and nitrogen fixation, but if these do not absorb all the available power it will be applied to the further industrial development of the district. Transmission lines will be constructed to Leipsic, Dresden and other places in the south, and also to Brandenburg and Berlin.

At the beginning of this year the Akt.-Ges. Ostpreussische Kraftwerke was formed to control the power stations and transmission lines in East Prussia, and undertake such further extensions as might be desirable In addition to the steam-power obtainable from Konigsberg, the company will also concern itself very closely with the development of water-power in the provinces.

In South Germany also water-power will be utilised. Since the middle of 1918 the Government has interested itself in the development of the water-power of the Lower Alz, for which purpose two companies have been formed—the Dr. Alexander Wacker Ges. f. Elektrochem. Industrie and the Alzwerke G.m.b.H. of Munich. The necessary water-power plant will be installed as soon as building operations are possible, and it is estimated that about 20,000 kw. will be available to start with. At the end of 1919 the Government co-operated with the Württenberg Government, and acquired an interest in the Württenbergische Landes-Elektrizitäts Ges., a federation of several electrical undertakings in that country charged more especially with the construction of a transmission line from Stuttgart to the Bavarian frontier for linking up various power systems. Other national projects are the development of water-powers in Bavaria, including the supply of power to Mecklenburg.

During the war the Government established two nitrogen-fixation plants, one at Piesteritz, near Wittenberg, and the other at Chorzow, in Upper Silesia, both of which use the Frank-Caro cyanamide process. For taking over the works at Piesteritz a national company, the Mitteldeutsche Stickstoffwerke A.G., has been formed, with a capital of 60,000,000 marks; whilst another company, the Oberschlesische Stickstoffwerke Akt.-Ges., controls the Chorzow undertaking. These two companies are entirely national in character, but beside these the Government is financially interested in others—*e.g.*, the Bayerische Stickstoffwerke, the Lonzawerke (Elektrochem. Fab.) G.m.b.H., at Waldeshut, in Baden, and in the Leuna works of the Badische Anilin-und Sodafabrik, where Haber's synthetic ammonia process is used. In collaboration with the Gewerkschaft Lothringen, the Government formed during the war a new company, the Chemische Werke Lothringen G.m.b.H., at Gerthe, in Westphalia, for working a process for the synthetic production of nitric acid and nitrate from ammonia liquor. This company is capitalised at 10,000,000 marks, of which the Government holds one-half. Financial interest has also been acquired in the Deutsche Phosphat-Gewinnungs-Ges. (formerly the Kriegs-Phosphat-Ges. m.b.H.) for exploiting the phosphate deposits in Germany.

Owing to the very acute shortage of copper during the closing years of the war every endeavour was made to increase the aluminium supply in Germany. The first factories to be built for this purpose were those at Horrem, Bitterfeld, and Rummelsburg, with a total annual output of 3,000 tons by the end of 1915. In the autumn of 1916 the Erftwerk Akt.-Ges., with a capital of 25,000,000 marks, was formed, with Government financial assistance, and an output of 12,000 tons of aluminium was obtained at the new factory at Grevenbroich. The Vereinigte Aluminiumwerke Akt.-Ges. of Berlin was next established with a capital of 50,000,000 marks, of which the Government subscribed one-half. This company took over the first three factories named, and also erected a new factory, the Lautawerk, capable of electrolysing 12,000 tons of aluminium per annum, together with a clay treating plant of 36,000 tons capacity per annum. Both the Erftwerke and the Lautawerk use electrical power derived from lignite, but at an early stage it was apparent that the works could not compete with foreign factories which had the advantage of water-power. In 1917, therefore, the Innwerk, Bayerische Aluminium A.G. was formed in Munich for developing the water powers of the Inn for the production of aluminium. This project has been, however, considerably delayed, and is hardly yet begun.

# Market Report and Current Prices

*Our Market Report and Current Prices are exclusive to* THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co. and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

## Market Report

THURSDAY, May 27.

Business has been quiet during the past week, particularly in the industrial districts, due no doubt to the Whitsun holidays extending over the greater part of the week. After the holiday break buyers show a tendency in some directions to defer adding to their commitments on account of the easier tendency in such stable raw materials as cotton and wool.

Well-informed quarters, however, regard the chemical position as being eminently sound and anticipate a full resumption of the demand after a very short interval.

There is little new to report in regard to export business, which continues satisfactory and remains limited only by the scarcity of supplies.

### General Chemicals

ACETONE is moving off well and although the price is nominally without change a firmer tendency appears to be developing.

ACID ACETIC is a firm and active market and a scarcity of supplies for prompt and early shipment is anticipated.

ACID CARBOLIC is unchanged, but owing to the export restrictions the tendency is slightly easier.

ACID CITRIC.—There has been some profit taking on this article, which has temporarily depressed its value.

ACID FORMIC is unchanged in value and only a moderate business is passing.

ACID OXALIC is in good demand and the limited supplies are readily absorbed.

ACID TARTARIC is in fair demand and price is steady.

AMMONIUM SALTS are unchanged in value, but it is difficult to secure parcels except for distant positions.

ARSENIC is only moderately enquired for and remains a featureless market.

BARIUM SALTS are in better demand, and a good volume of business is passing in chloride and sulphate.

BLEACHING POWDER is a nominal market and the small parcels for export demand exorbitant figures.

CALCIUM ACETATE is particularly firm and supplies are difficult to obtain.

COPPER SULPHATE is again lower in price, consequent upon the absence of export demand.

FORMALDEHYDE is quietly steady and the limited supplies available are readily absorbed.

LEAD SALTS exhibit a firmer tendency consequent upon the improvement in the metal.

MAGNESIUM SALTS have been rather quieter, but the undertone is good.

POTASSIUM PRUSSIATE is moving off satisfactorily and the price is extremely firm.

POTASSIUM PERMANGANATE is steady and the small supplies available are readily disposed of.

SODIUM ACETATE.—Only a moderate business is passing without change in value.

SODIUM CAUSTIC is in good demand for export, and the tendency is on the whole firmer.

SODIUM HYPOSULPHITE is a nominal market and it is difficult to name a value for such parcels as are available for early delivery.

SODIUM NITRATE is unchanged in price, but is in quieter demand.

SODIUM PHOSPHATE is distinctly firmer, and little is available for early delivery.

SODIUM PRUSSIATE is quiet and easy.

SODIUM SULPHITE is as scarce as ever, and prices again show an advance.

TIN SALTS are all quiet and easy in sympathy with the metal.

ZINC SALTS are without change on the week.

### Coal Tar Intermediates

There is nothing fresh to report in the intermediate position, and prices are all the same as quoted in our list last week.

### Coal Tar Products

The markets generally are very firm, with one or two exceptions, but business is somewhat difficult, owing to the uncertainty with regard to export licences.

90's BENZOL is in good demand at 2s. 9d. to 2s. 10d. per gallon on rails.

CREOSOTE OIL is in good demand at 1s. to 1s. 1d. in the North, and 1s. 1d. to 1s. 2d. in the South.

SOLVENT NAPHTHA 90/160 is rather slow of sale and there are sellers at 2s. 9d. per gallon.

HEAVY NAPHTHA 90/190 is in good demand at 3s. 4d. to 3s. 6d. per gallon.

NAPHTHALENE remains scarce, and the prices are somewhat irregular; crude is worth £15 to £22 per ton, according to quality, and refined £36 to £40 per ton. Some sellers are asking as much as £50 per ton.

PITCH.—The market continues firm and there is a good demand for next season's deliveries. Business is being done at 160s. to 165s. f.o.b. East Coast, and there are very few sellers on the West Coast at much under these prices.

### Sulphate of Ammonia

The Home demand continues good and some parcels have been sold for export at prices fixed by the Control.

## Current Prices

### Chemicals

| | per | £ | s | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|---|
| Acetic anhydride | lb. | 0 | 3 | 6 | to | 0 | 3 | 9 |
| Acetone oil | ton | 90 | 0 | 0 | to | 95 | 0 | 0 |
| Acetone, pure | ton | 120 | 0 | 0 | to | 125 | 0 | 0 |
| Acid, Acetic, glacial, 99-100% | ton | 120 | 0 | 0 | to | 122 | 10 | 0 |
| Acetic, 80% pure | ton | 97 | 0 | 0 | to | 98 | 10 | 0 |
| Arsenic | ton | 100 | 0 | 0 | to | 105 | 0 | 0 |
| Boric, cryst. | ton | 74 | 10 | 0 | to | 76 | 0 | 0 |
| Carbolic, cryst. 39-40% | lb. | 0 | 1 | 3 | to | 0 | 1 | 3½ |
| Citric | lb. | 0 | 6 | 0 | to | 0 | 6 | 3 |
| Formic, 80% | ton | 125 | 0 | 0 | to | 130 | 0 | 0 |
| Gallic, pure | lb. | 0 | 7 | 3 | to | 0 | 7 | 9 |
| Hydrofluoric | lb. | 0 | 0 | 7 | to | 0 | 0 | 8 |
| Lactic, 50 vol. | ton | 62 | 0 | 0 | to | 63 | 0 | 0 |
| Lactic, 60 vol. | ton | 75 | 0 | 0 | to | 77 | 10 | 0 |
| Nitric, 80 Tw. | ton | 41 | 0 | 0 | to | 44 | 0 | 0 |
| Oxalic | lb. | 0 | 2 | 11 | to | 0 | 3 | 0 |
| Phosphoric, 1.5 | ton | 65 | 0 | 0 | to | 67 | 0 | 0 |
| Pyrogallic, cryst | lb. | 0 | 11 | 6 | to | 0 | 11 | 9 |
| Salicylic, Technical | lb. | 0 | 2 | 10 | to | 0 | 3 | 0 |
| Salicylic, B.P. | lb. | 0 | 3 | 8 | to | 0 | 3 | 10 |
| Sulphuric, 92-93% | ton | 8 | 0 | 0 | to | 8 | 10 | 0 |
| Tannic, commercial | lb. | 0 | 5 | 0 | to | 0 | 5 | 3 |
| Tartaric | lb. | 0 | 4 | 0 | to | 0 | 4 | 2 |
| Alum, lump | ton | 19 | 10 | 0 | to | 20 | 0 | 0 |
| Alum, chrome | ton | 93 | 0 | 0 | to | 95 | 0 | 0 |
| Alumino ferric | ton | 9 | 0 | 0 | to | 9 | 10 | 0 |
| Aluminium, sulphate, 14-15% | ton | 17 | 10 | 0 | to | 18 | 10 | 0 |
| Aluminium, sulphate, 17-18% | ton | 20 | 10 | 0 | to | 21 | 10 | 0 |
| Ammonia, anhydrous | lb. | 0 | 1 | 9 | to | 0 | 2 | 0 |
| Ammonia, .880 | ton | 32 | 10 | 0 | to | 37 | 10 | 0 |
| Ammonia, .920 | ton | 20 | 0 | 0 | to | 24 | 0 | 0 |
| Ammonia, carbonate | lb. | 0 | 0 | 7½ | to | | — | |
| Ammonia, chloride | ton | 115 | 0 | 0 | to | 120 | 0 | 0 |
| Ammonia, muriate (galvanisers) | ton | 60 | 0 | 0 | to | 65 | 0 | 0 |
| Ammonia, nitrate | ton | 60 | 0 | 0 | to | 65 | 0 | 0 |
| Ammonia, phosphate | ton | 130 | 0 | 0 | to | 135 | 0 | 0 |
| Ammonia, sulphocyanide | lb. | 0 | 2 | 3 | to | 0 | 2 | 6 |
| Amyl, acetate | ton | 360 | 0 | 0 | to | 370 | 0 | 0 |
| Arsenic, white, powdered | ton | 67 | 10 | 0 | to | 70 | 0 | 0 |
| Barium, carbonate | ton | 13 | 10 | 0 | to | 14 | 10 | 0 |
| Carbonate, 92-94% | ton | 14 | 10 | 0 | to | 15 | 0 | 0 |

| | per | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|---|
| Barium, chlorate | lb. | 0 | 1 | 4 | to | 0 | 1 | 5 |
| Chloride | ton | 36 | 0 | 0 | to | 37 | 0 | 0 |
| Barium, Nitrate | ton | 55 | 0 | 0 | to | 56 | 0 | 0 |
| Sulphate, blanc fixe, dry | ton | 25 | 10 | 0 | to | 26 | 0 | 0 |
| Sulphate, blanc fixe, pulp | ton | 15 | 10 | 0 | to | 16 | 0 | 0 |
| Bleaching powder, 35-37% | ton | 18 | 10 | 0 | to | 19 | 10 | 0 |
| Borax crystals | ton | 41 | 0 | 0 | to | 42 | 10 | 0 |
| Calcium acetate, Brown | ton | 20 | 0 | 0 | to | 21 | 0 | 0 |
| ,, Grey | ton | 35 | 0 | 0 | to | 37 | 10 | 0 |
| Carbide | ton | 30 | 0 | 0 | to | 32 | 0 | 0 |
| Chloride | ton | 9 | 10 | 0 | to | 10 | 10 | 0 |
| Carbon bisulphide | ton | 58 | 0 | 0 | to | 59 | 0 | 0 |
| Casein, technical | ton | 80 | 0 | 0 | to | 83 | 0 | 0 |
| Cerium oxalate | lb. | 0 | 3 | 9 | to | 0 | 4 | 0 |
| Chromium acetate | lb. | 0 | 1 | 2 | to | 0 | 1 | 4 |
| Cobalt acetate | lb. | 0 | 7 | 3 | to | 0 | 7 | 6 |
| Oxide, black | lb. | 0 | 7 | 9 | to | 0 | 8 | 0 |
| Copper chloride | lb. | 0 | 1 | 3 | to | 0 | 1 | 6 |
| Sulphate | ton | 45 | 0 | 0 | to | 46 | 0 | 0 |
| Cream Tartar, 98-100% | ton | 300 | 0 | 0 | to | 305 | 0 | 0 |
| Epsom salts (*see* Magnesium sulphate) | | | | | | | | |
| Formaldehyde 40% vol | ton | 345 | 0 | 0 | to | 350 | 0 | 0 |
| Formusol (Rongalite) | lb. | 0 | 4 | 0 | to | 0 | 4 | 3 |
| Glauber salts | ton | Nominal. | | | | | | |
| Glycerine, crude | ton | 70 | 0 | 0 | to | 72 | 10 | 0 |
| Hydrogen peroxide, 12 vols. | gal. | 0 | 2 | 8 | to | 0 | 2 | 9 |
| Iron perchloride | ton | 50 | 0 | 0 | to | 52 | 0 | 0 |
| Iron sulphate (Copperas) | ton | 4 | 15 | 0 | to | 5 | 0 | 0 |
| Lead acetate, white | ton | 95 | 0 | 0 | to | 97 | 10 | 0 |
| Carbonate (White Lead) | ton | 75 | 0 | 0 | to | 77 | 10 | 0 |
| Nitrate | ton | 72 | 0 | 0 | to | 75 | 0 | 0 |
| Litharge | ton | 62 | 10 | 0 | to | 65 | 0 | 0 |
| Lithopone, 30% | ton | 59 | 0 | 0 | to | 61 | 0 | 0 |
| Magnesium chloride | ton | 15 | 10 | 0 | to | 16 | 10 | 0 |
| Carbonate, light | cwt | 2 | 15 | 0 | to | 3 | 0 | 0 |
| Sulphate (Epsom salts commercial) | ton | 14 | 0 | 0 | to | 14 | 10 | 0 |
| Sulphate (Druggists') | ton | 18 | 10 | 0 | to | 19 | 10 | 0 |
| Manganese, Borate | ton | 190 | 0 | 0 | to | | — | |
| Sulphate | ton | 105 | 0 | 0 | to | 110 | 0 | 0 |
| Methyl acetone | ton | 95 | 0 | 0 | to | 100 | 0 | 0 |
| Alcohol, 1% acetone | gall. | Nominal. | | | | | | |
| Nickel ammonium sulphate, single salt | ton | 50 | 0 | 0 | to | 52 | 10 | 0 |
| Potassium bichromate | lb. | 0 | 2 | 2 | to | 0 | 2 | 3 |
| Potassium Carbonate, 90% | ton | 102 | 0 | 0 | to | 105 | 0 | 0 |
| Chloride | ton | Nominal. | | | | | | |
| Chlorate | lb. | 0 | 0 | 10 | to | 0 | 0 | 10½ |
| Meta-bisulphite, 50-52% | ton | 270 | 0 | 0 | to | 280 | 0 | 0 |
| Nitrate, refined | ton | 70 | 0 | 0 | to | 72 | 0 | 0 |
| Permanganate | lb. | 0 | 5 | 9 | to | 0 | 6 | 0 |
| Prussiate, red | lb. | 0 | 6 | 3 | to | 0 | 6 | 6 |
| Prussiate, yellow | lb. | 0 | 2 | 3½ | to | 0 | 2 | 4½ |
| Sulphate, 90% | ton | 31 | 0 | 0 | to | 33 | 0 | 0 |
| Salammoniac, firsts | cwt. | 5 | 15 | 0 | to | | — | |
| Seconds | cwt. | 6 | 0 | 0 | to | | — | |
| Sodium acetate | ton | 61 | 0 | 0 | to | 63 | 0 | 0 |
| Arsenate, 45% | ton | 60 | 0 | 0 | to | 62 | 0 | 0 |
| Bicarbonate | ton | 10 | 10 | 0 | to | 11 | 0 | 0 |
| Bichromate | lb. | 0 | 2 | 0 | to | 0 | 2 | 1 |
| Bisulphite, 60-62% | ton | 50 | 0 | 0 | to | 52 | 10 | 0 |
| Chlorate | lb. | 0 | 0 | 5¾ | to | 0 | 0 | 6¼ |
| Caustic, 70% | ton | 43 | 10 | 0 | to | 44 | 10 | 0 |
| Caustic, 76% | ton | 44 | 10 | 0 | to | 45 | 10 | 0 |
| Hydrosulphite, powder, 85% | lb. | 0 | 3 | 9 | to | 0 | 4 | 0 |
| Hyposulphite, commercial | ton | 37 | 10 | 0 | to | 40 | 0 | 0 |
| Nitrite, 96-98% | ton | 120 | 0 | 0 | to | 125 | 0 | 0 |
| Phosphate, crystal | ton | 39 | 0 | 0 | to | 41 | 0 | 0 |
| Perborate | lb. | 0 | 2 | 2 | to | 0 | 2 | 4 |
| Prussiate | lb. | 0 | 1 | 9 | to | 0 | 1 | 9½ |
| Sulphide, crystals | ton | 30 | 0 | 0 | to | 32 | 0 | 0 |
| Sulphide, solid, 60-62% | ton | 60 | 0 | 0 | to | 62 | 10 | 0 |
| Sulphite, cryst. | ton | 15 | 10 | 0 | to | 16 | 10 | 0 |
| Strontium carbonate | ton | 85 | 0 | 0 | to | 90 | 0 | 0 |
| Nitrate | ton | 90 | 0 | 0 | to | 95 | 0 | 0 |
| Sulphate, white | ton | 8 | 10 | 0 | to | 10 | 0 | 0 |
| Sulphur chloride | ton | 42 | 0 | 0 | to | 44 | 10 | 0 |
| Sulphur, Flowers | ton | 24 | 0 | 0 | to | 26 | 0 | 0 |
| Roll | ton | 24 | 0 | 0 | to | 26 | 0 | 0 |
| Tartar emetic | lb. | 0 | 3 | 5 | to | 0 | 3 | 6 |
| Tin perchloride, 33% | lb. | 0 | 2 | 6 | to | 0 | 2 | 7 |
| Perchloride, solid | lb. | 0 | 3 | 0 | to | 0 | 3 | 3 |
| Protochloride (tin crystals) | lb | 0 | 2 | 0 | to | 0 | 2 | 1 |
| Zinc chloride, 102 Tw. | ton | 22 | 0 | 0 | to | 23 | 10 | 0 |
| Chloride, solid, 96-98% | ton | 60 | 0 | 0 | to | 65 | 0 | 0 |
| Oxide, 99% | ton | 82 | 10 | 0 | to | 85 | 0 | 0 |
| Oxide, 94-95% | ton | 70 | 0 | 0 | to | 72 | 10 | 0 |
| Dust, 90% | ton | 90 | 0 | 0 | to | 92 | 10 | 0 |
| Sulphate | ton | 21 | 10 | 0 | to | 23 | 10 | 0 |

## Coal Tar Intermediates, &c.

| | per | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|---|
| Alphanaphthol, crude | lb. | 0 | 4 | 0 | to | 0 | 4 | 3 |
| Alphanaphthol, refined | lb. | 0 | 5 | 0 | to | 0 | 5 | 3 |
| Alphanaphthylamine | lb. | 0 | 4 | 0 | to | 0 | 4 | 3 |
| Aniline oil, drums extra | lb. | 0 | 1 | 5 | to | 0 | 1 | 6 |
| Aniline salts | lb. | 0 | 1 | 10 | to | 0 | 2 | 0 |
| Anthracene, 85-90% | lb. | | — | | to | | — | |
| Benzaldehyde (free of chlorine) | lb. | 0 | 5 | 6 | to | 0 | 6 | 0 |
| Benzidine, base | lb. | 0 | 12 | 6 | to | 0 | 13 | 6 |
| Benzidine, sulphate | lb. | 0 | 10 | 0 | to | 0 | 11 | 0 |
| Benzoic, acid | lb. | 0 | 5 | 6 | to | 0 | 6 | 0 |
| Benzoate of soda | lb. | 0 | 5 | 6 | to | 0 | 6 | 0 |
| Benzyl chloride, technical | lb. | 0 | 2 | 0 | to | 0 | 2 | 3 |
| Betanaphthol benzoate | lb. | 1 | 6 | 0 | to | 1 | 7 | 6 |
| Betanaphthol | lb. | 0 | 5 | 3 | to | 0 | 5 | 6 |
| Betanaphthylamine, technical | lb. | 0 | 8 | 6 | to | 0 | 9 | 6 |
| Croceine Acid, 100% basis | lb | 0 | 5 | 0 | to | 0 | 6 | 3 |
| Dichlorbenzol | lb. | 0 | 0 | 6 | to | 0 | 0 | 7 |
| Diethylaniline | lb. | 0 | 7 | 9 | to | 0 | 8 | 6 |
| Dinitrobenzol | lb. | 0 | 1 | 5 | to | 0 | 1 | 6 |
| Dinitrochlorbenzol | lb. | 0 | 1 | 5 | to | 0 | 1 | 6 |
| Dinitronaphthaline | lb. | 0 | 1 | 4 | to | 0 | 1 | 6 |
| Dinitrotoluol | lb. | 0 | 1 | 8 | to | 0 | 1 | 9 |
| Dinitrophenol | lb. | 0 | 3 | 6 | to | 0 | 3 | 9 |
| Dimethylaniline | lb. | 0 | 5 | 0 | to | 0 | 5 | 3 |
| Diphenylamine | lb. | 0 | 5 | 0 | to | 0 | 5 | 3 |
| H-Acid | lb. | 0 | 14 | 0 | to | 0 | 14 | 6 |
| Metaphenylenediamine | lb. | 0 | 5 | 9 | to | 0 | 6 | 0 |
| Monochlorbenzol | lb. | 0 | 0 | 10 | to | 0 | 1 | 0 |
| Metanilic Acid | lb. | 0 | 7 | 6 | to | 0 | 8 | 6 |
| Monosulphonic Acid (2:7) | lb. | 0 | 7 | 6 | to | 0 | 8 | 0 |
| Naphthionic acid, crude | lb. | 0 | 5 | 6 | to | 0 | 6 | 0 |
| Naphthionate of Soda | lb. | 0 | 6 | 0 | to | 0 | 6 | 6 |
| Naphthylamin-di-sulphonic-acid | lb. | 0 | 5 | 6 | to | 0 | 6 | 6 |
| Nitronaphthaline | lb. | 0 | 1 | 3 | to | 0 | 1 | 4 |
| Nitrotoluol | lb. | 0 | 1 | 4 | to | 0 | 1 | 6 |
| Orthoamidophenol, base | lb. | 0 | 18 | 0 | to | 1 | 0 | 0 |
| Orthodichlorbenzol | lb. | 0 | 1 | 2 | to | 0 | 1 | 4 |
| Orthotoluidine | lb. | 0 | 2 | 6 | to | 0 | 2 | 9 |
| Orthonitrotoluol | lb. | 0 | 1 | 7 | to | 0 | 1 | 8 |
| Para-amidophenol, base | lb. | 0 | 15 | 0 | to | 0 | 16 | 0 |
| Para-amidophenol, hydrochlor | lb | 0 | 15 | 6 | to | 0 | 16 | 0 |
| Paradichlorbenzol | lb. | 0 | 0 | 6 | to | 0 | 0 | 8 |
| Paranitraniline | lb. | 0 | 8 | 3 | to | 0 | 8 | 9 |
| Paranitrophenol | lb. | 0 | 2 | 6 | to | 0 | 2 | 9 |
| Paranitrotoluol | lb. | 0 | 5 | 3 | to | 0 | 5 | 6 |
| Paraphenylenediamine, distilled | lb. | 0 | 13 | 6 | to | 0 | 14 | 6 |
| Paratoluidine | lb. | 0 | 7 | 6 | to | 0 | 8 | 6 |
| Phthalic anhydride | lb. | 0 | 5 | 6 | to | 0 | 6 | 0 |
| R. Salt, 100% basis | lb. | 0 | 4 | 0 | to | 0 | 4 | 2 |
| Resorcin, technical | lb. | 0 | 11 | 6 | to | 0 | 12 | 6 |
| Resorcin, pure | lb. | 0 | 17 | 6 | to | 1 | 0 | 0 |
| Salol | lb. | 0 | 5 | 9 | to | 0 | 6 | 0 |
| Shaeffer acid, 100% basis | lb. | 0 | 3 | 6 | to | 0 | 3 | 0 |
| Sulphanilic acid, crude | lb. | 0 | 1 | 5 | to | 0 | 1 | 6 |
| Tolidine, base | lb. | 0 | 10 | 6 | to | 0 | 11 | 6 |
| Tolidine, mixture | lb. | 0 | 3 | 0 | to | 0 | 3 | 6 |

## Manchester Chemical Trade

SIR S. W. ROYSE & CO., LTD., in their monthly circular state:—The volume of new business during this month has been only moderate. Consumers are however calling for full quantities on contracts, stocks are low and manufacturers are well employed. Prices generally remain firm. The export demand for sulphate of copper has been disappointing, but the market continues steady, production having been reduced. A good business has however been done for home consumption. Green copperas has been moving freely, but the difficulty of securing suitable packages is interfering somewhat with the export trade. There is a good enquiry for acetate of soda for forward delivery and price is firm. Acetates of lead have been neglected, and, with offerings from the Continent, lower prices are being accepted. There has also been a falling away in the demand for nitrate of lead. The enquiry for carbonate of potash is only moderate but price is unchanged. Montreal potashes are still in short supply. Caustic potash continues scarce. White powered arsenic is in fair request and home producers are booked well ahead. The enquiry for yellow prussiates of potash and soda for near delivery has been disappointing, but a good business is reported for forward delivery on export account. Tartaric acid continues in good demand and stocks small, whilst little is doing in citric acid. With the arrival of shipments of cream of tartar the position is better as regards supplies, but the price is well maintained. Resale parcels of bichromates are

very scarce. Oxalic acid continues very firm and full prices are being realised for spot lots. Borax and boracic acid are still in short supply. Phosphate of soda is again dearer in the absence of stocks. There is no change to report in salammoniac or muriate of ammonia, makers being well supplied with orders. Caustic soda and ammonia alkali are in strong demand for export. Bleaching powder is in good request and price has been advanced. Soda crystals and bicarbonate of soda have been called for rather freely. Tar products generally continue to maintain their firm tone. Benzols are scarce and supplies are readily taken up. Toluols if anything are slightly firmer. There is a better demand for solvent naphtha and prices are steady. Creosote keeps in good demand with very little offering. Crude carbolic acid is firmer in tone and all available supplies are quickly absorbed. There has been some pressure to sell crystal carbolic and price is easier but liquid remains very firm and makers are booked well ahead. Naphthalenes continue their upward tendency. The demand for pitch is strong for both this and next year's delivery, and still higher prices are looked for. There is nothing new to report in sulphate of ammonia.

### The Cardiff By-products Market

Our Cardiff correspondent writes that the market remains steady, the general demand being sufficient to absorb the available supplies. Prices :—

| | |
|---|---|
| Sulphate of Ammonia— | |
| For home consumption (per ton o.t.) | £21 10s. net. |
| For export (per ton f.o.b.) | £30 to £40 |
| Benzol, 90's per gallon | 2s. 7d. to 3s. |
| Ditto, 50's per gallon | 2s. 7d. |
| Solvent Naphtha, per gallon | 3s. 3d. to 3s. 9d. |
| Heavy Naphtha, per gallon | 3s. 3d. to 3s. 6d. |
| Crude Naphthalene Salts, per ton | £10 to £16 |
| Pitch, per ton | 145s. to 155s. |
| Creosote, per gallon | 1s. to 1s. 1½d. |
| Motor Benzol, per gallon | 2s. 7d. to 3s. |
| Crude Benzol, per gallon | 2s. 7d. |
| Toluol, per gallon | 2s. 7d. |

## Sulphate of Ammonia

### Prices for 1920-21

THE Ministry of Agriculture and Fisheries and the Board of Agriculture for Scotland have come to an agreement with the great majority of the makers of sulphate of ammonia with regard to the maximum prices to be charged for this fertiliser in the season 1920-1921. These prices are the maximum nett cash prices for sulphate of ammonia containing 24¾ per cent. by weight of ammonia in makers' 2 cwt. bags delivered in quantities of not less than 4 tons to the purchaser's or consumer's nearest railway station or wharf in Great Britain, or f.o.b. British port in the case of sales to Ireland, Isle of Man, or the Channel Islands, and are subject to a trade discount in the case of sales to manure mixers, agricultural merchants, dealers and co-operative societies :—

| Month of delivery. | Price per ton in bags, nett cash. |
|---|---|
| June, 1920 | £23 10 0 |
| July, 1920 | 23 10 0 |
| August, 1920 | 24 0 0 |
| September, 1920 | 24 10 0 |
| October, 1920 | 25 0 0 |
| November, 1920 | 25 10 0 |
| December, 1920 | 26 0 0 |
| January, 1921 | 26 10 0 |
| February, 1921 | 27 0 0 |
| March, April and May | 27 10 0 |

The other conditions of sale remain the same as during the past season, except that the additional charges authorised for each additional ¼ of 1 per cent. of ammonia, for sulphate of ammonia containing less than 0·025 per cent. of free acid, and for sulphate of ammonia specially ground at the purchaser's request, have been raised to 5s. 6d., 7s. 6d. and 7s. 6d. per ton respectively ; and as the basis scale of prices now applies to minimum quantities of 4 instead of 2 tons, an additional charge of 5s. per ton is authorised for deliveries of 2 tons and over, but less than 4 tons.

Farmers should place their orders without delay with their usual dealer or co-operative society. Manure mixers, merchants, dealers and co-operative societies should send their orders to the British Sulphate of Ammonia Federation, Ltd., 30, Grosvenor Gardens, S.W. 1.

Fuller particulars of these prices and conditions of sale will be given in a leaflet which will shortly be obtainable, post free, on application to the Director-General, Land and Supplies Department, Ministry of Agriculture and Fisheries, 72, Victoria Street, S.W. 1.

## Benn Brothers Journals

### Some Features of the Current Issues

AERONAUTICS.

" Air Mails for Britain " ; " Micarta Propeller Tests."

THE ELECTRICIAN

" Poulsen System of Radiotelegraphy," by C. F. Elwell ; " Nationalisation of Electricity Supply," by Wm. M. Munro ; " Permanent Magnets in Theory and Practice," by S. Evershed.

THE GAS WORLD.

" Government Gas Regulation Bill " ; " The Production of Benzol " ; " Inventions for the Manufacture of Neutral Sulphate of Ammonia."

THE HARDWARE TRADE JOURNAL.

" Aluminium and Nickel Wares " ; " Benches for Metal Workers " ; " The Oil Hardening of Screw Gauges."

WAYS AND MEANS.

" The Human Element in Industry," by Kenneth Lee ; " Housing : Who is to pay ? " by John Baker ; " Is Labour Better Off ? " by Miss Violet Ralph.

THE FRUIT-GROWER.

National Federation of Retail Fruiterers' Conference ; " Economic Value of Hawks and Owls " ; " The Cultivators' Charter."

THE CABINET MAKER.

" Work of the Advisory Committee for the Cane Basket and Willow Industry " ; " Trade Schools in France : The Training of Apprentices " ; " Two-legged Tables."

### A Purchase by Benn Brothers

BENN BROTHERS, LIMITED, have purchased from the proprietor, Mr. J. G. Purcell, the goodwill and copyright of the monthly publication known as *The Leather Goods Recorder*. This valuable trade paper was established rather under a year ago in order to promote the interests of the important leather and fancy goods trade which, since the war, has drifted very largely into English hands. *The Leather Goods Recorder* will be continued as a section of *The Export World and Commercial Intelligence*, and will thus exercise a powerful influence upon the development of the English leather and fancy goods trade abroad. There is a tremendous demand at the present moment—a demand which is likely to last—owing to the total cessation during the war of the German fancy goods business and the disinclination of colonial and foreign markets to resume business connections with Central Europe. *The Leather Goods Recorder*, in conjunction with *The Export World*, will, it is anticipated, be able to exercise a considerable influence upon this trade and thus promote the building up of British exports.

### "Jobs for Demobs"

THE ROTARY CLUB OF LONDON, which has undertaken the urgent and important work of finding employers who will give employment to demobilised men, is peculiarly suited to tackle the proposition. The club is composed of some 300 members, each representing a different trade or profession, and is connected with 25 other Rotary Clubs scattered throughout the British Isles. It has fourteen distinct committees dealing with this question, and chemical manufacturers in difficulty in getting labour will doubtless get valuable help by writing to the Chemical and Drugs Committee, " Rotary Room," Horrex's Hotel, Norfolk Street, Strand, W.C.2. The Rotary Club Committees are working in co-operation with the Appointments Department.

# Company News

ZUNGON TIN SYNDICATE.—Dividend at the rate of 7 per cent. per annum for the half-year to December 31 last, payable June 15.

JOHN LYSAGHT, LTD.—The directors recommend a final dividend of 10 per cent. on the ordinary shares, making 20 per cent., less tax, for the year 1919.

LIVERPOOL NITRATE CO.—An interim dividend has been declared of 2s. per share, free of tax, for the half-year ended December last. This is the same rate as a year ago.

ANGLO-EGYPTIAN OILFIELDS. — The dividend for 1919, is equal to 20 per cent. on "B" shares, payable after the annual general meeting, which will be held in July.

CASTNER-KELLNER ALKALI.—An interim dividend at the rate of 20 per cent. per annum has been declared for the six months ended March 31, payable June 9 to holders on the books May 31.

BELL'S UNITED ASBESTOS CO.—A balance dividend has been declared on the ordinary shares of 1s. 6d. per share and a bonus of 1s. per share, making 17½ per cent. for the year 1919, against 15 per cent. for 1918, and £26,046 is carried forward.

CHLORIDE ELECTRICAL STORAGE.—A final dividend has been declared for the year ending March 31, of 1s. 4d. per share, free of tax, on the ordinary £1 shares, against 1s. per share a year ago. An interim dividend of 1s. per share was paid last December.

ROYAL DUTCH PETROLEUM.—It is announced that the directors intend making a new issue of shares at about the middle of June. The new shares will be offered at par to existing shareholders in the proportion of one new share for each two already held.

WHITEHAVEN HEMATITE IRON AND STEEL.—The report for the year ended March states that the profit was £21,143. The directors add £10,000 to reserve, appropriate £2,436 to depreciation of investment account, and carry forward £2,073. The dividend for the year is 12½ per cent., free of tax.

NIGER CO.—It is announced that 7,000,000 additional preference shares of £1 each in the Niger Co. are to be created. Of these 3,000,000 are to carry 8 per cent. per annum cumulative dividends, and to be offered to existing preference and ordinary shareholders. The dividend payable on the existing 500,000 6 per cent. preference shares is to be increased to 8 per cent.

NITRATE PRODUCERS' STEAMSHIP.—The report for the year to April 30 last, shows profit of £159,405 (after providing £130,000 for excess profits duty), and £20,185 was brought in, making £179,590. From this must be deducted balance of income tax and excess profits duty, general expenses, directors' fees, and interim dividend, amounting together to £77,987, leaving £101,603 for appropriation. It is proposed to pay a dividend of 5 per cent. for the final six months of the financial year, with a bonus of 5 per cent., free of tax, and to place £75,000 to reserve for depreciation, carrying forward £10,973.

MARITIME OILFIELDS.—The accounts for fifteen months from October 1, 1918, to December 31, 1919, show a net profit of £6,629, in which is included the company's share of dividends (still to be declared) of 10½ per cent., less tax, on the 6 per cent. cumulative preference shares and 5 per cent., less tax, on the ordinary shares of New Brunswick Gas & Oilfields, Ltd., which the directors of that company recommend. The amount at credit of profit and loss, including £401 brought in, is thus £7,030. Subject to payment of New Brunswick Gas & Oilfields dividends, the directors recommend a dividend of 9 per cent., less tax, on the ordinary shares, leaving to be carried forward £793. Meeting, 46, Charlotte Square, Edinburgh, June 16, at 12.15.

### A Japanese Chemical Journal

*Chemical Technology*, a Japanese monthly journal of chemistry and chemical industry, testifies in its bulk to the increasing interest in chemical enterprises taken by the Japanese people. Of the new manufacturing companies formed in 1919 chemical industries head the list with 315 companies and a capital value of 131,112,500 yen. With the exception of the commercial notes, which are in English, the journal is printed in the native language, and its matter covers a wide variety of current problems in chemical industry and chemical engineering.

# Chemical Trade Inquiries

| LOCALITY OF FIRM OR AGENT. | MATERIALS. | REF. NO. |
|---|---|---|
| Canada ... ... (Montreal) | Carbon; Tungsten; Nitrogen ... | — |
| Montreal ... | Crude Asbestos; Asbestos Fibre ... | — |
| France (Paris) ... | Industrial Oils ... ... ... | 722 |
| Latin America ... (Valparaiso) | Essential Oils; Drugs ... ... | 742 |
| Finland ... ... | Lead; Tin; Pig Iron Tubes; Galvanised Sheets | 721 |
| Spain (Madrid) ... | Caustic Soda; Anilines; Citric and Tartic Acids | 777 |
| Belgium (Brussels) | Paraffin; Caustic Soda ... ... | 759 |
| Cuba (Havana) ... | Chemicals ... ... ... ... | 783 |

# Aluminium Welding Case

### Judgment for the Patentees

In the Chancery Division on Friday, May 21, Mr. Justice Sargant delivered judgment in the action heard by him several weeks ago, in which Aktiengesellschaft für Autogene Aluminium Schweissung were the plaintiffs and the London Aluminium Company, Ltd., of Aston, Birmingham, the defendants. The plaintiffs complained of the infringement by the defendants of two letters patent of 1907 for improvements in welding aluminium. The defendants denied infringement, and asserted the invalidity of each of the patents on the grounds of (1) want of novelty and subject matter, (2) insufficiency of description in specifications, and (3) want of utility.

His lordship, in his judgment, said the defendants were charged with having infringed both letters patent by using for the purpose of welding aluminium articles flux covered by the claims in each specification, and in particular by having used such flux some time between April 11 and 15, 1918, in welding a certain aluminium lid to a certain aluminium saucepan. The defendants admitted that they welded the lid and saucepan in quesion, and that they made use of the flux; but they said that they were not manufacturers of the flux and had no knowledge of the composition of the particular flux used, except certain information acquired through their legal advisers for the purpose of a previous litigation between themselves and the plaintiffs. In this state of things there was no evidence given at all on behalf of the defendants to show that the flux used by them was not an infringing flux, though it was obvious that they had in their hands the materials for establishing the fact, if fact it were.

On the other hand, there was direct and uncontradicted evidence on the part of Mr. Ballantyne, principal witness for the plaintiffs, that the remains of the flux on the saucepan consisted of a mixture of alkali chlorides with some fluorides, and apparently a little sulphate. Further, there was uncontradicted evidence, both by Mr. Ballantyne and Dr. Passmore, that the flux ordinarily used to-day consisted mainly of alkali chlorides. In his lordship's judgment, the efore, the infringement by the defendants of both letters patent of the plaintiffs had been definitely established.

As to the defence of want of novelty and subject matter, his lordship was of opinion that the public knowledge involved in the three prior documents relied on—(1) Roscoe and Schlorlemmer, (2) Gooch, and (3) Bates—was not sufficient to deprive the plaintiffs' invention either of novelty or subject matter. He also held that the objection to the patents on the ground of insufficiency of description was not sustainable with regard to the last and principal head of defence, that of want of utility. It really divided itself into two sub-heads: (1) That no mixture either of alkali chlorides alone or with the addition of fluorides could produce a useful antogenous welding; and (2) that, although some such mixtures could produce such a welding, yet other mixtures within the description were useless for the purpose. His lordship said this defence broke down both from the practical standpoint and the theoretical. The defendants, therefore, had not established any of their defences to the action, and the plaintiffs were entitled to succeed. His lordship added that it had been agreed between counsel that the actual Order as the result of his findings should be discussed and settled immediately after the vacation.

# Commercial Intelligence

*The following are taken from printed reports, but we cannot be responsible for any errors that may occur.*

## London Gazette

### Partnerships Dissolved

BOWATER, J. F. B., HADEN, Z., and FOX, G. E., glass manufacturers, Bournheath, near Broomsgrove, Worcestershire, under the styl of the Imperi l Glass Co., by mutual consent as and from May 19, 1920. All debts received and paid by J. F. B. Bowater, Z. Haden, and G. E. Fox.

HEBB, E. J., Malsis Mount, Malsis Road, Keighley, Yorks, AMBLER, C. H., Park House, Malsis Road, Keighley, and ALLOTT, F., Glen Villa, Upper Mill, Saddleworth, Yorks, carrying on business as dyers, at Heathfield Dyeworks, Upper Mill, near Oldham, under the style of John Herbert & Co., by mutual consent as from January 31 All debts received and paid by F. Allott, who will carry on business at Heathfield Dyeworks, Upper Mill, under the name of The Heathfield Dyeing Co.

### Liquidators' Notices

BRITISH COALITE CO., LTD.—A general meeting of members will be held at 62, London Wall, London, E.C. 2, on June 30, at 11.30 a.m. H. Bacon and J. H. Macaulay, Liquidators.

COALITE, LTD.—A general meeting of members will be held at 62, London Wall, London, E.C. 2, on June 30, at 11.15 a.m. H. Bacon and J. H. Macaulay, Liquidators.

### Companies Winding Up Voluntarily

SWISS CELLULOID CO., LTD.—A meeting of creditors will be held at 3, Crosby Square, London, on Friday, June 4, at 2.30 p.m. E. Norton, Liquidator.

VITRIFIED COAL CO., LTD. (in voluntary liquidation).—A general meeting of members will be held at 108, The Exchange, Mount Stuart Square, Cardiff, on Friday, June 25, at 11 a.m. F. J. Broomfield, Liquidator.

## Mortgages and Charges

[*NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, created after July 1, 1908, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges which would, if created after July 1, 1908, require registration. The following Mortgages and Charges have been so registered. In each case the total debt, as specified, in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced since such date.*]

LONDON & BURMESE WOLFRAM CO., LTD., LONDON, E.C.—Registered May 11, £25,000 debentures; general charge. *Nil. Dec. 31, 1919.

MIDLAND TEXTILE SOAP & CHEMICALS, LTD., DERBY—Registered May 10, mortgage securing all moneys due or to become due, to London County Westminster and Parr's Bank, Ltd.; charged on land and premises in Derby.

STANDARDISED CHINA CLAY CO., LTD., LONDON, E.C.—Registered May 13, £1,248 debentures; general charge. *Nil. April 2, 1920.

### Satisfaction

KENT FULLERS EARTH, LTD., LONDON, E.C.—Satisfaction; registered May 11, £400 registered Feb. 11, 1914.

## County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. Where a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

WYLIE, R. T., 7, High Street, High Wycombe, chemist. £12 8s. 9d. April 13.

GENERAL CHEMICAL CO., 15, Queen Street, Wigan, chemists, £50 18s. 5d. April 13.

## New Companies Registered

The following list has been prepared for us by Jordan & Sons, Ltd., company registration agents, 116 and 117, Chancery Lane, London, W.C.:—

CARBIS CHINA CLAY AND BRICK CO., LTD., Y.M.C.A. Buildings, St. Austell, Cornwall.—Clay merchants, brick and tile manufacturers. Nominal Capital, £35,000 in 35,000 shares of £1 each. Minimum Subscription, 20 per cent. Directors: S. H. Pedlar, Ruthern, Bodmin, Cornwall; J. Perry, "Penvale," St. Austell, Cornwall; S. B. Perry, "Brazacott," St. Austell, Cornwall; J. Tonkin, "Tregardock," Bugle, Cornwall; D. Warne, 3, Elm Terrace, St. Austell, Cornwall; J. Pascoe, Ruthern, Bodmin, Cornwall. Qualification of Directors, £500. Remuneration of Directors, £250.

CLEMENT & JOHNSON, LTD., 19, Sicilian Avenue, W.C.1. Medical, research and manufacturing chemists. Nominal Capital, £5,000 in 5,000 ordinary shares of £1 each. Directors: J. G. A. Clement, 122, Southampton Row, W.C.; P. A. Arnold, 60, Dumbreck Road, Eltham, S.E.; C. W. Forward, 251, Upper Richmond Road, S.W.; W. J. Bartholomew, 27, Campbell Road, West Croydon; J. M. Clement, 122, Southampton Row, W.C.

GRAPHITE OILS CO., LTD., Bread Street House, E.C.2.—Manufacturers of all kinds of graphite, oil, paint, grease, &c. Minimum subscription, seven shares. Nominal Capital, £200,000 in 200,000 shares of £1 each. Directors: J. A. Montgomerie, Cambuslang, Glasgow; F. W. Gough, 72, George Street, Bridgeton, Glasgow; H. W. Heard, North Side, Clapham Common, S.W. Qualification of Directors, £500. Remuneration of Directors, £150 each.

HOLBORN GLASS WORKS, LTD., 70, King Street, South Shields.—Manufacturers of glass. Nominal Capital, £20,000 in 20,000 shares of £1 each. Directors: T. T. Anderson, 12, Logan Terrace, South Shields; A. Elders, 5, Challoner Terrace West, South Shields; C. H. Blackwood, 3, Sydenham Terrace, South Shields. Qualification of Directors, £1.

LILLESHAL COAL DISTILLATION CO., LTD.—Manufacturers and dealers in coke, breeze, tar, ammonia, crude benzole and other by-products. Nominal Capital, £50,000 in 50,000 shares of £1 each. Directors: Colonel Williamson, The Grange, Hednesford; C. H. Wright; T. E. Freeston, Priors Lee Hall, Shifnal, Salop. Qualification of Directors, one share. Remuneration of Directors, £100 each.

LYLCO, LTD., 43, Berners Street, Oxford Street, W.—Manufacturers of toilet perfume and other chemical and medicinal preparations. Nominal capital, £25,000 in 25,000 shares of £1 each. Directors: A. Wellor, J. de Lysle, Major G. D. Pullar. Qualification of Directors, £100.

SOCLEANO, LTD., 23, Denmark Place, Charing Cross Road, W.C.2.—Manufacturers of soaps, powders, liquids, pastes and disinfectants, &c. Nominal Capital, £5,000 in 5,000 shares of £1 each. Directors: L. B. Wright, 40, St. Mary's Grove, Chiswick, W.4; M. Hassam, 24, Priory Court, West Hampstead, N.W.; C. T. Sharland, Venlow, 10, Wellesley Road, Chiswick, W.4. Qualification of Directors, 200 shares.

OCEAN CHEMICAL CO., LTD., 61 & 62, Chancery Lane, W.C.1.—Chemical manufacturers. Nominal Capital, £120,000 in 120,000 shares of £1 each. Directors to be appointed by subscribers. Qualification of directors, 1 share.

WALTHAM ABBEY OIL MILLS, LTD.—Producers and distributors of oils, &c. Nominal Capital, £110,000 in 100,000 participating preference shares of £1 each, and 200,000 ordinary shares of 1s each. Minimum subscription, 7 £1 shares. Directors to be appointed by subscribers. Qualification of directors, £250. Remuneration of directors, £250. Subscribers: R. Hancock, 1, Vernham Buildings, W.C. 1; F. Hockaday, 82, Geraldine Road, Wandsworth; and five others.

WALKER DYEING CO., LTD., Calderside Works, Hebden Bridge, Yorks.—Bleachers, dyers and calico printers, &c. Nominal Capital, £12,500 in 12,500 ordinary shares. Directors to be appointed by subscribers. Qualification of directors, 100 shares.